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ABSTRACT

This collection of papers is devoted to a study of the impact of developing nations' technological and economic development within the context of health related factors, including pharmaceuticals and food and nutrition. Titles and authors are as follows: (1) "Health, Development and Technologies: An Appraisal" (B. Jackson and A. Ugalde); (2) "Health and Development: A Marriage of Heaven and Hell?" (G. Borrini); (3) "Health Implications of Urbanization" (R. Halberstein); (4) "Drugging the People: Pills, Profits, and Underdevelopment in Nigeria" (S. Alubo); (5) "Drugs and Underdevelopment: A Case Study of Kano State, Nigeria" (R. Stock); (6) "Unequal Access to Pharmaceuticals in Southern Cameroon: The Context of a Problem" (S. van der Geest); (7) "Infant Feeding Practices in Mexico" (M. Cerqueira et al.); (8) "Modernization, Agricultural Exports, Food Availability and Nutrition in Central America: 1960-1980" (A. Ugalde); (9) "A Research Note: The Roles of Community Health Aids and Economic Development in the Nutritional Status of Children in Western Jamaica, 1973-1984" (B. Melville); (10) "Environmental Sanitation and Infant Mortality: A Study of Relationships in Ile-Ife, Nigeria" (B. Feyisetan); (11) "The Implications of Culture Contact for the Delivery of Health Services among Ngawbere" (Panama) (K Bletzer); (12) "The Introduction of High-Technology Industry in Tula, Hidalgo, Mexico: Health Care Implications for the Semi-Urban Peasant Class" (B. Jackson and T. Stocker); and (13) "Information Technology: The Case of the Microcomputer in the Third World. Colonial Plot or Appropriate Technology?" (W. Bertrand). Tables, references, and information about contributors are included. (JHP)

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The Impact of Development and Modern Technologies in Third World Health

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INTRODUCTION

HEALTH DEVELOPMENT AND TECHNOLOGIES: AN APPRAISAL

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The concept of health has very different meanings to the populations of the world. Health or the relative absence of it can serve as a discriminating feature between the developed and the developing world. The health conditions that characterize many Third World nations are those that characterized the developed nations one hundred years ago. They include high infant mortality rates, high birth rates, high morbidity rates and a relatively abbreviated life expectancy at birth. Today in the Third World the major causes of death are still infectious diseases as opposed to degenerative diseases in industrial nations.

The improvement of health status of Third World populations is the result of a complex meshing of factors and cannot be simplistically attributed to the modernization and development of medical care. Frequently policy makers and political leaders think that health and medicine are synonymous and, as a result, also think that the promotion of health requires the presence of hospitals, the training of specialized physicians and the acquisition of the most advanced medical technologies. The seminal work of McKeown and an increasing number of studies have shown that, historically, health improvements have been associated with better environmental habitats, nutrition and education, and not so much with the presence of medical facilities and personnel. This is an important acknowledgement. Unfortunately, it has been erroneously interpreted by many to mean economic development. That is, the placement of medical care after other prerequisites for improving the health status has led to the false assumption that economic growth will be followed by better health conditions. This new interpretation is now being questioned by some students of development and, more and more, we find evidence suggesting that development, modernization and the technologies used to produce them not only have a limited impact on health, but in some instances they have had detrimental effects on the health status of the population.

This collection of articles is devoted to the study of the impact of technological and economic development on the Third World within the context of health status. In this respect, impact can best be analyzed in terms of effect. There can be both positive and negative effects resulting from the implementation of a development program. Positive effects are those that contribute to an improved health status as exemplified by improved economic conditions, the adoption of health-enhancing behavioral practices, cleaner environmental conditions and political and financial policies that support action to alleviate poor health standards. Negative effects are, of course, those that contribute to a decrease in health status either through a loss of economic or agricultural capabilities, poorer environmental conditions, abandonment of traditional health-promoting cultural practices, social stress or political prevention. The effects of a particular program can be multiple and may perhaps reflect both positive and negative trends.

In a similar yet distinct view, it is obvious that technologies can be used for the benefit of a few or for the benefit of the majority. It is not a matter of questioning the potential that modern technologies might have for the good of mankind. What needs to be critically analyzed is the manner in which new technologies are used, and the way in which the very same process of development and modernization is being implemented. In this regard, the evidence is very disquieting, because the examples that are emerging from many nations strongly suggest that those who reap the benefits of modern technologies and the development of the Third World are their elites and the industrial nations. With some qualifications, this analysis can be applied to the health sector. We underline the need to qualify it because the health sector is particularly complex, and little will be gained by making gross generalizations. Thus, low infant mortality is strongly correlated with economic development, major advances are being made in the Third World in the control of a few contagious diseases, and life and suffering saving technologies have been introduced successfully in many countries.

Scholars and practitioners of development theory have often questioned the appropriateness of introducing new advanced technologies in the Third World. Cost-benefit analysis, social conditions such as high levels of un/underemployment, and lack of supporting facilities are commonly voiced as reasons to delay the transfer of these technologies. The term "adequate technologies" has been coined and become part of developmental jargon. Again, with some qualifications, this analysis can be applied to the health sector. Thus, the concept of cost-benefit analysis might be inadequate when we deal with life and suffering saving technologies. But new technologies which increase costs and do not produce new curative effects, such as me-too drugs, can certainly be classified as undesirable. At the same time, there is a danger that life and suffering saving technologies may be classified as inappropriate only because they are costly. It is frequently argued that high technology hospitals or equipment are not adequate or appropriate because the investment of resources in these facilities and/or technologies have less impact on health than if these resources had been allocated to primary health care. This is a false dilemma. The way in which some technologies are used may be questionable. For example, the use of tertiary and/or university hospitals for normal deliveries is not a wise allocation of resources. New, expensive and scientifically demonstrated life and suffering saving technologies should be used in the Third World and elsewhere. The argument can be made that the choice is not between these technologies and primary care, but between them and other expenditures, such as military equipment. We do not deny the futility of acquiring technologies which cannot be used because of the lack of necessary supporting materials or personnel. Students of Third World health services are well acquainted with examples of expensive equipment that was purchased and never installed, or installed equipment that is seldom utilized. These cases should not be offered as excuses for postponing the introduction of life and suffering saving technologies, however, but as examples for the need of improved planning.

We are not opposed to the use of advanced and expensive technologies in the Third World, as is clearly manifested in the previous paragraph. However, there are many technologies which are introduced in the Third World, for the purpose of producing economic growth, that can be considered as undesirable for the development of a country and for the health of its population. Fertilizers and pesticides are one of the many examples frequently used to illustrate the negative effects of modernization on the quality of life and health of Third World populations. The introduction of extensive cash cropping has, in many regions of the world, depleted the soil of nutrients. When this occurs, growers, in order to maintain the level of production, need to introduce large amounts of fertilizers which contaminate the soil and enter into the food chain. On the social side, cash cropping tends to concentrate land ownership in the hands of a few and increase unemployment among the peasants. Furthermore, cash crop prices fluctuate so wildly that once prosperous regions can become suddenly economically depressed. The following example clearly shows the interrelationship between modernization and health. A cotton growing region in Northern Mexico which used large amounts of fertilizers had to discontinue production when prices collapsed. The region was then turned into alfalfa to be used as feed for a newly developed dairy industry. Some time later, a research team found that chemicals in quantities considered unsafe from the fertilizers and pesticides used for the cotton were present in the diary products.

Another type of questionable technologies are those developed to undo the damage incurred in the process of economic growth and development, or to reduce the costs of services. The concept of risk-benefit is invoked frequently as a decisive factor in the implementation of a chosen technology. It is frequently the case that, when such a technology is applied with the objective of reducing illness, little research has been conducted to explore possible alternative solutions without potential side effects. This is the case, for example, with chlorine, a convenient and inexpensive chemical with harmful side effects. This chemical need not be used for water purification when there are other treatment or handling technologies available, albeit more expensive.

In the health sector, particularly in the Third World, we find a number of technologies which have been produced to cover the exploitation of the many by the few. We would call them palliative technologies, a prototype of which are the oral rehydration salts. The treatment of diarrhea by the inexpensive and easy to prepare package of salts serves to postpone the introduction of social changes required to prevent rather than cure the disease, thus transforming the Alma Ata declaration into a cruel parody. A few have gone so far as to include some vaccinations as examples of palliative technologies.

The articles that follow are mostly written from the perspective of what has come to be known as the political economy of health, although it could be argued that a more appropriate term might be the political sociology of health and illness, since the articles deal more with issues of power and domination than with the economic aspects of these relationships. The article by Grazia Borrini presents a theoretical overview of those elements generally considered to be the principal determinants of the Third World's health status. A review of the standard theoretical constructs used to explain the existence of widespread poor health conditions in the Third World is presented. Discussion is centered on the concept of intervention with regard to governmental and international financial agency response and community action.

Change, as a feature of development, has become rapidly accelerated in the past twenty years and has had largely unanticipated results. The massive trend for urbanization is apparent in nearly every country of the Third World. The rapid concentration of populations in cities as a result of internal migration and high birth rates has caused enormous problems of overcrowding and often dismally inadequate provision of municipal services such as sanitation and water supply. However, the disadvantages may be outweighed by the greater accessibility of health care services, a greater opportunity for profitable employment and enhanced educational avenues. Halberstein's article provides an overview of the effects of urbanization on health status in the Third World. The author discusses many of the features of the urbanization process, i.e. physical living conditions, noise and pollution levels, changing morbidity and dietary patterns, that are affecting health in explosively growing cities of the developing nations.

The selection by Feyisetan describes an in-depth study of one aspect of modernization and urbanization, that of the implementation and utilization of municipal water, sanitation and disposal system. The author's findings present an interesting example which demonstrates that technologies proven to be successful for the maintenance of health in advanced nations may have the opposite effect in the Third World.

The rapidly changing conditions in the Third World and the glaring inadequacies of governments to meet the basic health needs of their populations have served as a motivating factor in the World Health Organization's development of a primary health care policy which has been adopted by the governments of virtually all of the Third World nations. The policy of primary health care is a grassroots system wherein administrative procedure is conceived as a process channeled from the bottom up versus the case in industrialized health service systems. The community itself is considered the focal point of the primary health care system and the mobilization of community members with the utilization of appropriate technologies is integral to the philosophy. Melville's research note on the work of Community Health Aides in Jamaica illustrates the role of community workers as a principal component of a primary health care program. The author builds a case for the effectiveness of the CHA in improving nutritional standards in one of the more economically stressed areas of the country.

The strategy of primary health care has been less emphasized in the urban areas of the developing world than in the rural. Perhaps more evident in the urban zones has been the evolving tendency for the development and importation of First World medical care strategies. However, there has been little effort to gauge and/or assess the relative success of primary health care policies in a broad sense. The conjunction of the acceleration of development strategies with the implementation of a high technology and alternative health care systems in the Third World is one that should not be ignored. Nor should the effect of "modern" health care service delivery on traditional patterns of health care be ignored. A goal of primary health care policies is a comfortable mixing of traditional and modern medical beliefs and practices that are socially and medically appropriate. Bletzer's work on the Ngawbere of Panama considers the impact of the entry of "modern", nontraditional health care services on cultural networks and relationships of an indigenous population.

Programs designed to promote industrial development are in evidence through the less developed countries of the world. Development of industry includes the importation of sophisticated equipment and the need for trained workers to operate it. Industrial development often emphasizes urban growth as it frequently requires a large concentration of people from which to draw its employees. The results of industrial development are diverse and can range from increasing wage earning potential so as to procure a more adequate diet, an essential component of good health, to creating a situation where the occupational hazards of working in the industrial arena far outweigh the benefits in relationship to health standards. The case study presented by Jackson and Stocker examines the impact of a regional development project in central Mexico with specific regard to the needs and necessities of the poor population of the area, the intended "target population".

Industrial development has as a major feature the utilization of advertising techniques to sell the finished product. The use of media and advertising can have extremely important effects on health status and health practices. These effects can be both positive and negative. The most well-known case of a negative effect is that of the strong advertising campaign used by some infant formula producers in the Third World. The result was a drastic rise in infant mortality deaths as a consequence of incorrect usage of infant formula and improper preparation techniques. The paper by Cerquiera et al. on infant feeding practices in Mexico illustrates the effects of advertising on infant nutrition in addition to the effects of changing lifestyles as a result of urbanization and increased female employment. The article addresses several important issues, particularly with regard to the sociocultural incentives for shifting from bottle to breast feeding.

The initiation of industries related to health care must also be considered within the realm of industrial development. Many countries have started to produce their own pharmaceuticals and are now able to sell them to their populace at a fraction of the cost of an imported drug. Medical equipment has also started to be produced by developing nations. The importation and development of high and moderate technology systems relating to health care services and products has resulted in the increased use of pharmaceuticals and greater immunization coverage. However, the inappropriate and often extreme overuse of pharmaceuticals has been well documented. The articles devoted to the topic of pharmaceuticals in this issue present specific case examples which demonstrate the channeling of drugs through the various networks present in the country and the sociocultural perceptions of pharmaceutical usage patterns. The authors of these three articles, Alubo, Stock and van der Geest, concur on the conclusion that while the national government health agencies often cannot provide adequate pharmaceutical coverage, the same drugs are readily available in the private sector. The three articles touch on different aspects of a similar topic, the role of financial gain in pharmaceutical distribution, which allows for an interesting point of comparison within Africa and other developing nations.

The use of microcomputers has become virtually institutionalized in the health service sector of the developed world. It is also increasingly becoming an important tool for administrative and information processing tasks in businesses and public sector services in the Third World. Questions have been raised as to the appropriateness of this new trend in the developing nations with the obvious implications of possibie over-expenditures on imported, sophisticated equipment when there is so much need for basic equipment and services. Bertrand addresses these issues in his article and provides a case study to illustrate the tasks performed with a microcomputer in a developing country's public health sector. While there is no question that microcomputers will become standard office equipment for the health sector in the Third World, what still remains an issue is the impact on decision-making which may be made by the additional information made available through the use of a computer. Past experiences suggest that the available information was seldom used by policy makers. There is no evidence to suggest that increased amount of information will change this situation.

Developers commonly stress the goals of agricultural development as a means of improving living conditions of the world's poor. Agricultural development can include highly technological innovations such as the use of sophisticated machinery to enhance production and create greater acreage for cultivation. Agricultural development programs can also be designed for more participation in the economic realm of a country by shifting from a subsistence-based agricultural system to one devoted to the cultivation of cash crops for sale on the world market. Techniques employed by developers include creating greater amounts of arable lands through damming of rivers and other landscape modification efforts. The use of pesticides and herbicides has become extremely common in the Third World as a result of the desire to improve crop production. The shift from subsistence to cash crops may have an effect on the buying power of the population and/or it may decrease available food resources to the poor. Again, the effects of agricultural development can be both negative and positive. Ugalde's contribution examines the effects of agricultural development from the perspective of the international agricultural trade and its effect on the local situation with regard to agricultural products available and the economic resources necessary for their purchase.

The articles in this issue devoted to the impact of technological and economic development on health status in the Third World provide an avenue with which to display many of the programs that have been initiated in a variety of Third World settings and to evaluate their impact on health status. The effects of technological and economic development on health that are examined by the authors of this collection include several of those factors that converge to characterize a population's health status. As mentioned previously, we are well aware that this issue can only touch upon some of these important factors and cannot assume to be fully comprehensive in its scope. However, the topics discussed and case studies presented reflect the diversity of programs, policies and technological interventions implenented to promote health status in a number of Latin American and African countries. The selection of articles presented is predominantly negative in their conclusions. Only two of the twelve present information supporting positive health effects of some aspects of development programs. Nonetheless, the result should not be a sense of overwhelming pessimism or failure; rather, it should be one where the information presented will serve for change and progress in the goal of elevating health standards in the Third World. As readers, the material presented in the following pages can provide us with the opportunity to compare and contrast programs, social and political situations, policies and effects and theoretical constructs and arguments. Perhaps this issue can help to serve as a tool with which to design future programs that have as their aim the elimination of past mistakes and the optimization of the changes for success of future programs and policies.

OVERVIEW

HEALTH AND DEVELOPMENT: A MARRIAGE OF HEAVEN AND HELL?

GRAZIA BORRINI
University of California, Berkeley

INTRODUCTION

The customs, the environment and the ways of life of the inhabitants of our planet vary enormously between urban and rural populations, men and women, rich and poor, people of different race, cast, class, culture and religion. Today, however, it is most common to hear about the differences between "developed" and "underdeveloped" people (also euphemistically called "developing" people). Neglecting judgements of merit and preference, which find meaning only within that culture which created a particular way of life, we can ask ourselves whether these differences are reflected in the health status of the population. For instance, we can compare a few general indicators of physical survival and wellbeing. We find (see Table I) that the average life span is much longer in rich and developed countries (mainly, but not entirely, because of a smaller infant mortality). We find that infectious diseases and parasites are much more common in poor and underdeveloped countries (this may be partially explained by their mostly tropical climate, and balanced by the fact that other types of illness are not so widespread). It is in these countries, and especially in recently born shantytowns around the main cities or in some desolate rural areas, that we meet with the worst sanitary conditions: clean water still a luxury, no sewers, large families crowded in small places with inadequate heating, cooking and washing facilities, very poor personal and property security; adults and children working long hours in dangerous environments, medical and social assistance almost nonexistent. As if that were not enough,

Table 1

TABLE I

	Life Expectancy at birth (years)		% of Population with access to safe water		% Children 1 Year Old immunized against polio	Mortality Rate of Children 0-1 year old (per 1,000 children of same age)		Mortality Rate of Children 1-4 years old (per 1,000 of same age)		Mortality Rate (annual deaths per 1,000 individuals)		GNP Per Capital in $
	60	81	Urban Areas	Rural Areas	(1980)	60	81	60	81	60	81	(1981)
Countries w/very high infant mortality rate (IMR) IMR > 100*	37	47	69	20	10	180	140	41	26	27	19	320
Countries w/high infant mortality rate 60 > IMR > 100	47	57	85	21	37	140	90	27	11	20	11	870
Countries with medium infant mortality rate 26 > IMR > 50	60	69	91	50	67	80	40	9	2	11	7	1770
Countries w/low infant mortality rate IMF < 25	70	74			32	31	12	2	(*)	9	9	9110

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*IMR is infant mortality rate, number of deaths per year under 1 year of age, per 1,000 children born alive.

** is less than 0.5%

Among countries with IMR > 100 are Burkina Faso, Afghanistan, Ethiopia, Nepal, Sowalia, Senegal, Bolivia, Bangladesh, Egypt, India, Turkey, Haiti, Saudi Arabia.

Among countries with 60 > IMR > 100 are Burma, Indonesia, Lybia, South Africa, EC Salvador, Ecuador, Kenia, Guatemala, Colombia, Iraq, Peru.

Among countries with 26 > IMR > 50 are Mexico, Philippines, Thailand, Arguiha, Chile; South Korea, URSS, China.

Among countries with IMF < 25 are Italy, Cuba, Israel, USA, Spain, Japan, Poland, Sweden.

The data of this table are from "The State of the World's Children", UNICEF, 1984.

tremendous socio-ecological catastrophes, such as the famines and floods which have recently killed hundreds of thousands of people, seem to "happen" only in underdeveloped countries.

What are the roots of these catastrophes, of which the great famine in African countries to the south of the Sahara is one of the latest and most terrible examples? Is there an immediate cause of such events? Or are we dealing with the acute phase of a chronic disease (only those die from hunger who are also in normal times exposed to hunger)? There exist precise theories and opinions about the main determinants of the African famine and similar catastrophes, and in general about the health scarcity of underdeveloped populations. The analysis of these theories is very significant, for it is the way in which a problem is defined that inspires and indicates its possible "solution". This paper will discuss these theories by grouping them within a few fundamental categories: (1) geography and climate; (2) population pressure; (3) economic underdevelopment and technological backwardness; (4) historical factors and recent dynamics of socio-culture change. Different kinds of developmental projects and interventions will then be connected with the underlying, often unexpressed, assumptions about the health problems which they are supposed to solve. Some conclusion will be drawn on the relationship between development and health.

GEOGRAPHY AND CLIMATE

The drought that recently struck the Sahel (the zone bordering the southern Sahara desert and extending from the Senegal almost to the Red Sea) is a climatic phenomenon. Some hypothesized it was caused by a climatic mutation on a grand temporal scale, tied to variations of volcanic activity and to the increased concentration of carbon dioxide in the atmosphere (Bryson 1973). Others invoked the sunspots (Lamb 1974). Still others suggested that an increased concentration of dust may have blocked the sunlight and so created a colder and dryer than normal zone in the Sahel. The dust would have originated from the ground erosion of vast areas whose covering vegetation had slowly disappeared (McLead 1976). An alleged rapid desertification of the areas to the south of the Sahara had been denounced for a long time (Stebbing 1937; USAID 1972;

Ware 1975), but not without controversies concerning its extent (Dalby and Harrison 1973) and its causes. Some maintained that the traditional slash and burn agricultural practices, which make use of large fires to clean the land from vegetation before sowing, damaged the environment (Stebbing 1937). Others, however, asserted that these practices are innocuous or actually beneficial for the local ecology, and at any rate limited in their extension (Franke and Chasin 1980). Factors of a much more recent origin, such as the conversion of large forests to open space for cultivation, the intensive use of the soil, and above all the destruction of the vegetable covering by the overgrazing of pasture animals, were also supposed to have caused the deterioration of the environment that led to the drought (Stamp 1940; Wade 1974; Franke and Chasin 1980).

According to this last hypothesis, climatic changes are caused by human interference with an already fragile ecosystem, and not by bizarre celestial events (Ball 1975). And, indeed, not only in Africa can ecological deterioratio. be ascribed to a bad use of existing resources. On the island of Java, ground erosion has been caused by an indiscriminate destruction of the forests, first by Dutch colonizers to make room for plantations, then by the Japanese army, who cut large amounts of timber for military purposes. The results is that where once luxurious forests grew, the land is now dry and desolate (Franke 1974). The Northeast of Brazil, a once most fertile region with enormous potential for the production of food, is now to a large extent an arid and infertile land which has been aptly described as 600,000 square meters of suffering (DeCastro 1966). The trees and the natural vegetation were eliminated to make room for sugar cane plantations; these exploited the top-soil and left behind a poor, sterile, largely eroded land, which is now easy prey to floods. Similarly, extended laterization of the soil has followed cotton growing schemes promoted by the Sudanese government in the Azande area (McNeil 1972). In El Salvador, the coffee plantations have displaced the villages and their crops from the more fertile volcanic land. The population was forcefully relocated into zones with poorer and more fragile soil which has been rapidly exhausted (Durham 1979). Nor are the great forests of the planet spared, in Amazonia, Guyana, and in the Congo basin. They are being increasingly exploited for commercial purposes and for the production of food, causing the destruction of an enormous number of unique and still largely unknown plant species, which may lead to unforeseeable climatic consequences (Raven 1984).

When disasters such as a drought or a flood are not directly responsible for miserable human health conditions, the intrinsic poverty of a region is often cited as the cause. The Sahel, for instance, is generally described as a miserable zone, able to produce only the bare minimum for keeping the population alive even in years of regular precipitations. Yet historically the Sahel has sustained the development of some of the vastest and richest African empires, such as the empire of Ghana (500-1200), the empire of Mali (1200-1450), the empire of Songhay (1450-1600) and various kingdoms that existed at different times in Burkina Faso, Chad and Senegal (Awe 1965; Boahen 1966; Levtzion 1973; Cissoko 1975). These empires could have developed only if there existed an ample surplus of food and exchange products. In fact, there is no reason to assume that a fragile ecological system must necessarily be poor and unproductive.

The Sahel only can be viewed as a poor geographic-climatic area if considered in isolation. In reality, however, the Sahel is inserted into an ecological system which, in gradual transition towards the south, changes from desert without any vegetation outside the oases to steppe with seasonal shrubs, to grassland, land covered with an increasing amount and variety of vegetation, thickly wooded spots, marsh regions and, finally, tropical rainforests. The character of the terrain is modified by the seasons, which regulate the hot and dry wind of the north and the humid wind of the south, which brings rains quite irregular in quantity and distribution. Nomadism is ideal for this kind of geography. Indeed, the Sahel has always been inhabited by nomadic herder populations. Traditionally, during the rainy season the nomads left the humid land of the south, because the marshes and water currents breed the tsetsefly, bearer of a grave cattle disease, and the north offers sufficient pastures for the animals. During the dry season they returned south, having travelled thousands of kilometers and established contact with a great number of diverse groups. A typical encounter, very important for both parties, was with the sedentary farmer populations of the south. The nomads exchanged meat, milk and milk products for millet and vegetables, while their cattle fertilized the land for future sowing. For a very long time this complex ecological and social reality allowed the peoples of the Sahel to live in prosperity and to exploit the local resources in an adequate and well-balanced manner. Thus, it is rather superficial to define these lands as poor and inhospitable. If the balance is presently breaking, this can not be ascribed to a change in geography or climate (Franke and Chasin 1980).

The arguments that reduce problems of precarious life to climatic-geographic conditions can be summarized with the word *scarcity*; hunger is the result of scarcity of food, just as poverty and misery are results of an insufficient production of material goods and services. According to Lappé and Collins (1977), this hypothesis serves only to conceal the real causes and responsibilities of the so-called natural disasters. They report that in 1942 more than one and a half million people starved to death in Bengal, a region in the Northwest of India. It is true that the rice harvest in the season preceding the famine was exceedingly poor because of lack of rain, but it is also true that in the very same year India exported both rice and grain. Furthermore, in the years preceding the famine the production of cotton increased by 85% due to huge investments, while the per-capita production of rice in Bengal declined by 38% (Blyn 1966). The situation was very similar during the famine of 1974 in Bangladesh. While people literally died for lack of food, four million tons of rice were stored in expectation of a price increase. Again in Mali, in the years before the famine of 1970-74, the land cultivated in cotton doubled while the land cultivated in cereals decreased. And in Latin America, where malnutrition is widespread, half the land in use (generally the most fertile land) is used for growing export crops and breeding cattle (again for export). Scarcity, therefore, is nothing but a *myth* (Lappé and Collins 1977). Indeed, there are even scholars who maintain that it is the very *wealth* of a region - both in human and natural terms - which created the conditions for exploitation during colonial times, and has therefore resulted in misery and underdevelopment today (Frank 1972; Galeano 1973). In fact, favorable geological and climatic conditions, and a healthy indigenous labor force were needed for the establishment of the colonial export economies.

The difference between life conditions in the geographical North and South is real. This is most dramatically evidenced in statistics of life expectancy: most countries in which the average life expectancy is less than sixty, or even fifty years, are situated in equatorial and tropical areas (World Bank 1985). But the North-South difference, which is principally of a geographic and climatic nature (amount and periodicity of rainfall, solar irradiation, wind and ocean currents, kinds of flora and fauna), is also a cultural, social, and historical difference. Whether the particular geo-climatic conditions of the Southern countries have determined their social and historical paths, or whether their historical paths have conditioned and shaped the present human interaction with the natural environment, is a matter of debate. Most likely, both phenomena intertwined through the centuries to produce the present situation and the marked North-South differences we observe today in quantitative indicators of human survival.

POPULATION PRESSURE

The second category or current of thought concerning the causes of hunger and health scarcity focuses on the population factor and its pressure on the natural environment. While the world's population increases at an accelerating rate, those who reproduce more quickly are the poorer and less well fed (PRB 1984). Each additional person is said to aggravate the problem not only because he or she is an additional mouth to be fed, but because he or she is a further weight for the ecological system and the economy of a country (Meadows et al. 1972; Ehrlich 1973; Brown and Eckholm 1974; Echols 1976). The Sahel, for instance, is supposed to become more and more arid because there are too many cattle consuming the meager vegetation. In turn, the cattle increase in number because people increase in number (Wade 1974). Thus, in the Sahelian and other examples of ecologic and economic crises, excessive population would be the main culprit.

This simple and direct analysis is perhaps one of the best known and most accessible to the public. But its simplicity can hide superficiality. Certainly, a rapidly increasing population presents grave problems in the short run. For such a population the relative number of children is very high, therefore the need for social services is very high. If the growth of production keeps pace with the demographic growth, the pressure on the environment may as well increase. Yet, it does not follow that the natural resources, used in an appropriate way, would not be capable of sustaining a population larger than the present one (Simon 1977). A study by the Massachusetts Institute of Technology maintained that by itself the Sahel could produce food for two million people in addition to those actually living there (Seifert and Kamrany 1974). And considering the potential productivity of all the nations of the continent, a study estimated that Africa could nourish up to almost three times its actual population (World Bank 1984). Furthermore, economic growth seems to proceed more rapidly in countries in which the population expands than in countries with a stable population (Simon 1977).

Until recently, the production of food has, on the average, kept pace with the population increase, not only in the world at large but also in poor countries considered as a separate group (Murdoch 1980). There are, however, numerous exceptions, mainly among the countries of sub-Saharan Africa. For instance, Somalia, Mozambique, Senegal, Lesotho and Zambia have seen their food production per capita drop by about 30% in a few years (World Bank 1985). As regards the future, some writers present the situation as a desperate race between the production of food and the increase in population. Although some view the future with optimism (Bale and Duncan 1983; Simon and Kahn 1984), in general the predictions are gloomy. In particular, the Global 2000 report to the United States President has called much attention to the progressive erosion of Earth's carrying capacity. According to the report, the present environmental and population-related stresses are bound to result in impoverishment and life degradation for many of the world's inhabitants (USCEQ 1980). How could the sub-Saharan countries produce enough food for fifteen to twenty million additional people every year, when today they are not even able to feed their living population (Adedeji 1985)?

Even if in the future there will be enough food to sustain the whole world's population, it is unlikely that the poor countries will be able to pay the price on the world markets (Brandt Commission 1983). This pessimistic point of view has led to theories of so-called lifeboat ethics.

According to these theories, only part of the population of this planet will be able to survive: those without hope should be left to their fate as quickly as possible (Paddock and Paddock 1967; Hardin 1974). Food aid should be concentrated on those countries who "can hope to make it" (triage), otherwise one would merely end up encouraging population growth, and therefore aggravating the problem rather than solving it (Hardin, 1976). Others maintain that food aid is dangerous not "because it helps to keep alive people without space and resources", but because it creates a situation of forced dependence on foreign countries, it has a negative influence on the production of food in the receiving countries and it tends to neutralize the popular pressure for reforms (Lappé et al. 1981). Also, food aid often promotes the consumption of non-local products. For instance, 60-70% of US food aid to Africa consists of grain or flour, foreign to local production and consumption patterns (Jackson 1982). In addition, food aid tends to occur in a discoordinated and discontinuous way, and in a vacuum of structural reforms. The African nations should count on planned and safe support for at least several years; they would be able to develop local production and execute reforms (Eicher 1982).

Many of those who have firmly rejected "lifeboat ethics" maintain that the growth of population and the patterns of food production are intimately connected and mutually dependent. According to Murdoch (1980), it is poverty, and especially poverty in the rural areas, which makes it impossible to nourish the increasing population and, at the same time, limits the food production. This vicious cycle would be maintained and reinforced by both the internal economic structure of many developing countries, and the external constraints imposed on them by the rich nations. Mamdani (1972) has emphasized that population density is not in itself a problem ("the masses of Calcutta make a greater impression on us than the masses of London not because one deals here with more people, but with people who are visibly poor and in a miserable condition"). And Franke and Chasin (1980) present the argument in an original way:

> The people of the Sahel were not simply producing more people to be cared for during the years preceding the famine: they were also producing

more from the land, for outside markets as well as for themselves. It could be argued that once the drought came, larger and more dense populations would have had more human resources to put to work in both relief efforts and efforts to salvage the environment and begin the process of reconstruction. That people were not put at work at these tasks can hardly be a byproduct of their numbers per se. The explanation must be sought in the organization of these efforts.

But why does population increase? What drives the poorer people to set so many children into the world? Most often, the answer is that poor people behave rationally: many children mean greater possibilities for the entire family - while one son can seek work in the city and send money home, others can take care of the fields, and of the ill or elderly relatives (Mamdani 1972). To have many children multiplies the chances of survival of the family, an important factor in precarious living situations. This started at the time of the colonial domination. The colonial period (from the slave trade to the extortion of taxes, from the forced induction into foreign armies to the progressive exploitation of local land and resources) stimulated the colonized population to have large families in order to survive. It is true that medical interventions and sanitation contributed to decrease the mortality rate, and this resulted in population increase. It is also true that parental motivations are still the main reason for population growth. Improvements in the life conditions of the parents and better chances of survival for the children already born are likely to reduce the birthrate in developing countries just as these factors have reduced it in developed ones (Murdoch 1980). In fact, the birthrate is negatively correlated to economic well being, the availability of social services and the level of employment and education (especially for the female population).

Finally, some ask whether it is illogical for the population to expand in those African countries - like Mali or Burkina Faso - which could use more rural labor (Franke and Chasin 1980). If, however, that shortage was due to migration to urban areas, it would not be mitigated by a population increase. And with respect to Latin American countries, Eduardo Galeano (1973) has pointed out that:

> Most Latin American countries have no real surplus of people; on the contrary, they have too few. Brazil has thirty-eight times fewer inhabitants per square mile than Belgium, Paraguay has forty-nine times fewer than England, Peru has thirty-two times fewer than Japan. Haiti and El Salvador, the human antheaps of Latin America, have lower population density than Italy. The spreading and imposing of family planning [...] aims to justify the very unequal income distribution between countries and social classes, to convince the poor that poverty is the result of the children they do not avoid having. These pretexts are an insult to our intelligence, the real intentions [of these policies] anger us.

Evidently, a thorough exploration of the population controversy has to take into account absolute indicators, such as demographic counts and growth rates, together with relative indicators, such as population density in particularly poor or rich areas, distribution of resources, and cultural and social change.

ECONOMIC UNDERDEVELOPMENT

According to the third current of thought, the problems of the so-called Third World result mainly from its economical and technological "backwardness". The key categories here are development and underdevelopment. Bridging the gap between the two requires the modernization of the productive sectors by means of appropriate capital investments, technological innovations and expansion of infrastructures. Prime indicator of development is the growth of the gross national product (GNP) and of the volume of exchanges in the internal and international markers. Again, the analysis is very simple. People suffer because they lack goods and services: the 'cake' is not big enough for all. Increase the dimensions of the cake (increase the amount of goods and services), and the problem will be solved. Although the concept of "developing other countries" can be traced to colonial times, its impulse, and its emphasis on economics, peaked after World War II. The successes of the Marshall Plan and Recovery Programs in Europe suggested that an extension of economic aid to Third World countries would have soon lifted them out of their "backward" conditions. This, many argue, is what indeed occurred. Data collected in the last decades show a positive correlation between indicators of economic development (for example, the GNP), and some health indicators (see Table 1). Also, food production increased substantially after the introduction of new seeds, such as the varieties of rice and grain of the "Green Revolution" (Bale and Duncan 1983). It is usually assumed that if the total caloric production of a country has increased, the nutritional status of its population has improved.

All theories of economic development are strategies for increasing the dimensions of the 'cake', and aim to increase its per capita consumption. Some theories emphasize the role of capital investment as a prerequisites for development (Nurkse 1953; Hirschman 1958; Rostow 1960; Rosenstein-Rodan 1961). According to these theories, capital investments in the economic sector sustain production and stimulate the demand for goods and services in the internal market, while investments in the socio-political sector are meant to remove the structural obstacles to "economic takeoff". International aid fits well into this scheme, providing both capital and technological innovations. Other theories, following more closely the analyses of Marx and Ricardo, accentuate the labor force rather than capital. According to them, any production increase is a consequence of the increased productivity of the labor force (Myint 1954), or of its use in a more appropriate way (Lewis 1955). Whether we look at matters from a standpoint of socialist ideology (Lenin 1963; Kamenov and Vulchev 1974), structuralism (Nurkse 1953; Lewis 1955; Rosenstein-Rodan 1961) or neoclassical capitalism (Little 1984), the picture is the same: economic development must be promoted to control the natural environment and thereby increase the wellbeing and health of the human population. In turn, economic development can only be achieved through the continuous innovation and improvement of the means of production, that is, it depends on scientific and technological progress.

Economic theorists have dealt at length with the role of capital, labor and technology, but have neglected the contribution to the productive process of both the natural environment and the specific cultural milieux of the affected populations. The natural environment (the "rest of the system") has most often been treated as a process constant.

This assumption was perhaps reasonable in the early decades of the industrial revolution. Lately, however, with the development of more powerful and widespread technological means, along with the sustained growth of human population, the natural environment has been strongly affected by the production of goods and services (chemical and radioactive pollution, destruction of specific habitats, disappearance of vegetable and animal species, near depletion of irreplaceable resources, transformation of natural into artificial systems, climatic and geographical changes, etc.) Nature displays strong resilience and the ability to restore a healthy equilibrium after injury, yet some natural environments have already been hopelessly sacrificed, and the planetary ecological equilibrium is showing disquieting signs of progressive deterioration. Despite all this, economic science tends to deal with the environment as if the second law of thermodynamics would not exist or would not apply to economic phenomena (Georgescu-Roegen 1971).

In the short term, the price of environmental deterioration is mostly felt by the weakest social strata, such as the poor living in highly polluted industrial environments, the nomads deprived of the vast grazing lands necessary for the survival of their herds, or the people dislocated from their homes because of the building of dams or the establishment of industrial, commercial or touristic enterprises. These people pay for "development" with physical sickness and the disruption of their lives. Similarly, they pay the highest price in socio-cultural health terms, because of the changes which usually accompany the transition from traditional to developed society: impoverishment of social life, breaking of family ties, imposition of material values and associated behaviors over symbolic values and customs. The seasonal workers who reside for most of the year far from their families and homeland provide an extreme example of this phenomenon.

Theories of development have also arisen from the concrete experience of the developing countries themselves. The uniqueness of these theories has been their focus on the specific cultural, technological and social context of the populations concerned. One example is found in recent Chinese history, in the phase of Maoist revolutionary development that rejected economic growth as a goal in itself and emphasized agricultural improvements, anti-elitist egalitarianism and the building of local communities. Another significant example is the Gandhian philosophy, in which the traditional forms of village production and the traditional values of frugality and collaboration are key elements to improve the life of the Indian people. The advantages of a development keyed to small industries and crafts have been summarized by Myrdal (1968). Such development is more 'organic' and flexible, adapts itself better to particular local conditions, does not need great financial investments, and would put an end to the creation of "cathedrals in the desert" (Kohr 1973; Jacobs 1984).

Other researchers have directed attention to the urban bias of the main theories and emphasized the necessity of developing rural areas (Johnston and Kilby 1975; Lipton 1977; Eicher 1982). Murdoch (1980) pointed out that the industrial revolution in Europe had been preceded by an agrarian revolution (new technologies, seeds, opening of new land to cultivation) which led to a constant increase of agricultural output. On the contrary, the models of development applied in Third World countries have too often favored capital-intensive industries. India, for example, has concentrated on building large steel and power plants, financed with foreign capital. This kind of intervention, says Murdoch, has perpetuated in the developing world the existence of two "parallel economies", the urban and the rural, a system originated in the colonial period. The urban economy depends on the local elite which controls political and military power, urban industries, export of local products and foreign imports. Usually, the benefits of improved health care which might follow economic development are absorbed by these elite minorities (Navarro 1984). These groups maintain power thanks to their political and military connections in foreign countries and economic links to the transnational companies which regulate international trade (Frank 1972). The rural economy continuously loses products, labor and capital to the first, in a way suggestive of a process of "internal colonization" (Gritti 1985). Health services offered to rural communities, when provided at all, are scarce and unrelated to local realities (Navarro 1984). The health consequences come conspicuously into view in terms of infant mortality (see Table II).

TABLE II
Urban-Rural Differentials in Infant Mortality for Selected Developing Countries

	Year of Survey	Urban	Rural	Rural Pop. as % of Total
India	1980	65.0	124.0	76
Congo	1980	107.0	172.0	45
Mozambique	1975-80	130.0	183.0	83
Senegal	1978	71.4	136.8	66
Somalia	1975	146.0	174.0	67
Peru	1970-75	73.6	158.2	33
Syrian Arab Republic	1976-79	43.0	67.0	52
Papua New Guinea	1980	50.0	80.0	86

Sources: (1) National evaluation reports on the Strategy for Health for All by the Year 2000, (2) World Bank, World Development Report 1985.

The analysis just outlined offers an explanation for the failure, in the sixties and seventies, of the so-called *trickle down* policies of development. These policies rested on the idea that the poor would benefit in any case from the economic development of the "more advanced" strata of the population. Thus, it was meaningful to invest in a few trainant sectors of the economy, waiting for the rest of society to follow. By the end of the seventies, however, it was clear even to the World Bank that the poorest social strata had *not* benefitted from development programs (Alhuwalia *et al*. 1979; World Bank 1984). On the contrary, consistently with earlier forecasts of Kuznets (1955) and Myrdal (1957), during economic takeoff the distance in economic power between the rich and the poor *increased*, resulting in further misery for the latter. In their exhaustive study of non-communist developing nations, Adelman and Morris (1973) have shown that:

> Economic modernization shifts the income distribution in favor of the middle class and upper income groups, and against lower income

> groups.[..] Development is accompanied by an absolute as well as a relative decline in the average income of the very poor. Indeed, an initial spurt of dualistic growth may cause such a decline for as much as 60% of the population.

Some authors welcome modernization and economic development per se, but believe that a combination of national and international exploitation prevents most people from taking advantage of economic growth and any increased availability of goods and services. Their analyses focus on the relative concept of poverty vs. the absolute concept of scarcity, on distribution of goods and services vs. their mere production, and on patterns of growth vs. growth itself (Samater 1984). For instance, Samir Amin has spoken of irrationality of capitalism at the global level, and identified capitalism as the very root of misery (Amin 1973, 1976, 1985). Griffin (1978) wrote:

> In a world capitalist system composed of nation-states and characterized by rapid technical progress in the developed countries, the poor countries tend to be deprived of their most valuable resources, namely high level manpower and national economic surplus [..] through trade, migration, flow of finance capital [..] with the result that international inequality is increased and, in some cases, the standard of living of the mass of the poor is depressed absolutely.

Development programs have generally favored the specialized workers and the urban and industrial sectors over the non-specialized labor force and the rural sector, whose economic growth is much slower. Economic mirage and forced rural eradication have then set in motion a powerful process of urbanization. If this process continues at today's pace, by the year 2000 half of the world's population will inhabit urban areas (in 1971 this percentage was less than one sixth). For many, urbanizing means losing a system of support and cultural solidarity, and becoming "marginalized" and powerless (Gritti 1985). This is particularly true for the weakest social subjects, such as racial minorities, tribal groups or women, who may be subjected to new forms of oppression because of socio-economic change. For these particularly vulnerable people, terms such as "victims of progress" (Bodley 1982) and "victims of the miracle" (David 1977) have been coined.

Wealth and poverty are culturally relative concepts. In many societies, and perhaps also in our industrial societies, exchange and consumption of material goods and "utility-oriented" production are not the unique or main concern. Symbolic exchange, artistic expressions, leisure time, social rituals, spiritual practices and even voluntary choices of poverty (Rahnema 1986) well rival material gain. For instance, rural markets in Africa have minimal economic impact (very slow and unconspicuous exchange of goods), but play a fundamental role in the social life of the concerned populations. Transforming these markets into more efficient economic systems, where higher volumes of goods flow at a faster pace, goes against the will and the interests of local people. An argument may even be made that destruction and not construction of material wealth is an overriding, universal concern of cultures (Berthoud and Sabelli 1979, and references therein). Yet, theories and practices of "development" deal with people as purely economic entities, who necessarily want and benefit from producing more goods and services. The fact that above a certain threshold both production and consumption of goods may become meaningless or even counterproductive is generally not considered.

TECHNOLOGICAL BACKWARDNESS

During the initial phases of economic development of a "traditional" society, the return on invested capital is generally high, and the entry of foreign capital is encouraged. Since the fifties, private banks and international agencies have promoted enormous loans from the North, which the developing countries in the South hastened to accept. Initially, the conditions of these loans seemed quite favorable, and foreign capital guided the economic growth of many countries. In Mexico, for example, it created the economic basis of the new urban middle class. Today, however, some nations find themselves exporting their resources solely to pay the interest on their debt. This creates a continuous net flux of resources from poor to rich countries. Moreover, the debt allows the World Bank and the International Monetary Fund (IMF) to influence the political economy of debtor nations. These institutions determine the adjustment policies that countries in financial crisis have to adopt to maintain their foreign credit status. Along with the international market leaders, who establish the terms of trade, these institutions regulate the biological and human costs and the economic profits of "development".

One of the aims of the international loans was to enable the developing countries to acquire new technologies, and in particular the new food production technologies referred to as Green Revolution. The Green Revolution has replaced traditional cultivation and seed varieties. The new seeds, developed in years of laboratory and field work, yield higher productivity when treated with abundant irrigation, fertilizers, and pesticides. In places, the Green Revolution has in fact dramatically succeeded in its main aim of increasing the agricultural yield. Yet, more than a few problems have followed. At the international level, the North-South flow of capital and technology has contributed to the debt crisis and to the technological dependence of many developing countries. At the local level, increased agricultural output has rarely benefitted the malnourished or starving people. For instance:

> In the 1960s, Mexico seemed to be on the verge of permanent food self-sufficiency [..] and the gains in agricultural productivity provided the base for industrial growth rates matched by few other nations. [Yet] in the 1970s the country had drifted into becoming an importer of basic foodstuffs [..] and poverty persisted for many rural people. The Green Revolution had [just] been an enormous publicity success, promoted by politicians and private interests." (Wright 1984)

It has even been reported that the Green Revolution has caused new problems for the rural poor (Falcon 1970; Feder 1976; Hussain 1985). For instance, Java, a densely populated Indonesian island, welcomed the introduction of more productive rice varieties. Historically, however, access to the rice harvest had been guaranteed to all. As an old tradition, everybody could participate in the harvest work and receive a percentage of the rice gathered a compensation. The Green Revolution introduced important changes. Rather than a "high yield" variety, the new rice would be more appropriately called a "high response" variety, since it needs high doses of fertilizers and insecticides, and intense irrigation. Thus, the new technology requires monetary investments and must bring monetary returns. To dispose of the traditional harvest customs without losing face, the rice fields owners end up selling the harvest before season to people living outside the area. These people can harvest without allowing the poor to participate in the share. The poor must then buy the rice in the local markets. Perhaps the rice is not too expensive, but it is not very appetizing either - the new variety has a taste far inferior to the old one. A more important point, however, is the monetization of the economy: only those with monetary income can eat. Compared to the old system, the new system seriously disfavors the weaker social groups (women, elderly or sick people, etc.) who find work with difficulty in an economy with a surplus labor force.

New agricultural practices have produced negative consequences in two other aspects. First, because of active promotion of the new seeds, many indigenous varieties of potatoes, rice, maize and other cereals are disappearing. These varieties had lower yields, but higher nutritional value. They were also more robust and better resistant to the local climate and pests. Second, the pesticides necessary to sustain the new seeds have caused widespread acute and chronic poisoning of agricultural workers. Most pesticides used in the developing world (Paraquat, DBCP, Endrin, BHC, Aldrin, Dieldrin, Parathion, Methyl Parathion, Chlordano, Heptacloro, etc.) are banned in Europe and the USA. The way in which they are handled is also unsafe. They are sold in stores which also sell food, stored together with food and handled without masks or gloves or appropriate measuring devices. When the pesticides do not immediately affect the workers who apply them, they may still produce tragic consequences at a later time. This was the case in Iraq, in 1972, where at least 400 people died and thousands were poisoned because of the delayed effects of an organic mercury fungicide, used to coat wheat and barley. The poison worked its way into ecological cycles and the food chain, and reached people through poultry, meat, river fish and bread. That fungicide had been banned in the USA and in a number of other industrialized countries, but it was freely exported to Iraq by USA corporations (Taghi Farvar 1976). The production of pesticides, increasingly transferred to developing countries, is a dangerous industry. It is subject to disastrous accidents, obvious example being the Bhopal disaster, and provides slowly accumulating, non-dramatic injuries to the workers and the environment.

A technological innovation usually considered indisputably appropriate is the biogas plant, which produces biological gas from vegetable and animal waste. With this simple, small-size, relatively inexpensive procedure, dung can be converted into gas for domestic energy, and the residue can still be used as fertilizer. There are millions of converters of this type in China, and about 60,000 in India. However, while in China the biogas plants belong to a village, in India they tend to be in the hands of privates (in addition to the initial cost, the plant requires at least the waste products of two cows). In the latter case the benefits of the plant are enjoyed by a minority, while the dung, before freely collected and used, has now become a consumer good. Bought and sold in the market, the dung is out of reach for the destitute people for whom it used to be a unique source of free energy.

Technological innovations can increase the gap between the rich and the poor and further aggravate the life conditions of the latter, but not necessarily so. Several problems can be alleviated if not solved, merely by applying better technological means. For instance, it is now recognized that inside dwellings with open-fire cooking facilities , the air shows a high concentration of pollutants. Combined with weather exposure, this phenomenon may affect the incidence of respiratory diseases, one of the main causes of mortality in developing countries (de Konig et al. 1985). Carefully designed and locally produced stoves could provide better indoor air quality and a more efficient use of fuel. Yet, it has to be considered that the smoke - by blackcoating the straw roofs of dwellings - helps to kill dangerous parasites. Once the new stove is introduced, the rest of the dwelling has to change too.

Very simple health technologies, such as breastfeeding, oral rehydration therapy and growth monitoring of children, together with expanded immunization can save many millions of children from death (UNICEF 1984). Except for the improved vaccines and the cold chain needed to transport them in areas far from urban centers, these health technologies are not expensive nor sophisticated. Indeed, they mainly depend on the political will of governments to create and sustain a network of community health workers to promote them. However, in the case of large campaigns, such as mass vaccination of children, it is vital to remember that the complexity of the bio-social environment may counteract any aggressive, large scale approach. A sad example of such failure has been the chemical warfare against malaria. The use of increasingly more and more potent pesticides has been accompanied by an incidence of malaria equal, and at times greater, than pre-eradication campaign levels. Moreover:

> In Ethiopia, in the early 60's recrudescence of malaria caused some 150,000 deaths in an area where malaria was virtually not lethal previously: a temporary interruption of transmission had caused the natural immunity of the population to disappear. (Taghi Farvar 1976).

By comparison with this failure, the worldwide eradication of smallpox is a most inspiring accomplishment. It was achieved through a combination of careful monitoring of potentially affected areas, and immediate vaccination of the community where any single case was found. Vaccine technology and smart planning eliminated a scourge considered in 1775 "the most general of all diseases" in Europe, affecting ninety-five percent of the population and causing a death rate of one in seven. A disease brought to America by European colonizers and responsible for millions of deaths among the indigenous population, is finally defeated.

Among the most promising "new" technologies in food production are agroforestry, azolla/algae symbiosis in rice fields, raising of non-traditional animal species, use of zeolites in animal and fish feeding, biological nitrogen fixation and stimulation of plant growth with fungi (OTA 1985). Most of these technologies are very old and the novelty consists in exploring them for widespread use. It is questionable that technologies such as these need high level of economic growth to be successfully adopted. Whether new or old, or 'soft' or 'hard', technologies need to be evaluated within the particular environment of their utilization, and to be controlled by the community who adopts them. No technology is appropriate in an absolute sense, outside the context of the community into which it works. Only the affected people can decide whether technological change and economic growth are, for them, a positive "development."

HISTORICAL FACTORS AND RECENT DYNAMICS OF SOCIAL AND CULTURAL CHANGE

The above considerations aptly introduce the fourth current of thought about the determinants of widespread hunger and poor health conditions. This view emphasizes the recently increased vulnerability of human ecosystems in many of the so-called poor or underdeveloped countries (by human ecosystem I mean the biological, social and political environment in which a community lives). For instance, most precapitalist societies developed their social relations of production around the problems of risk and security. Communities had institutional and social means of providing security through a network of horizontal and vertical relationships and reciprocities. Watts (1983) has studied the caliphate and the individual Hausa states in Nigeria, where complex patterns of agricultural adaptation (.."risk-aversion" cultivations, preference of consumable versus marketable products, reliance on historically established planting and intercropping strategies..), constituted the technical skills to cope with environmental unpredictability. He writes.

> Under the aegis of the colonial State, peasant producers from the Nigerian Hausaland were progressively incorporated into the circuits of the global economy, largely through the colonial triade of taxation, export cropping and monetization. [..] As the peasantry were torn from a social matrix of kin affiliation and obligation, the existential problem of subsistence became subservient to marketing behavior. In short, the social nature of the subsistence system and the qualities of the moral economy were severely ruptured. Reciprocity and solidarity, and hence the nature of inequality itself, had changed. [Today] while all households are theoretically capable of coping with various forms of stress (drought, etc.) in practice these responses are refracted through the prism of social and economic inequality.

Thus, Watts declares that a famine is a social crisis, with historical roots in the colonial period, and reinforced today by the very process of 'development' from a traditional society to a society based on the market law. It is because of the deterioration of traditional practices and institutions in many communities that "..the economic risk is added to the natural risk..." (Clarke 1977). We arrive at paradoxes such as that "..during the famines of the past seventy years [in Nigeria], it has been the men and women who work on the land who have perished for lack of food. Those who died were those who produced (Watts 1980), and ".. town dwellers can still get something to eat, while country people starve." (Spitz 1978). Recent changes in the name of economic development, particularly cash crop cultivation, are responsible for great part of this phenomenon. Yet, cash crops are not born out of the modern "free market" but of colonial domination. The colonizers defined the colonized people's territories, political structures and trade patterns for their convenience and interests (Rodney 1972). Today's most depressed regions are those that experienced the largest volume of contacts with developed countries in the past. As noticed by Frank (1972), this contradicts the thesis that underdevelopment results from isolation and pre-capitalistic institutions.

> Walter Rodney wrote that the African peasant entered the colonial era with the hoe, and came out of it with the hoe. Rodney could have added that while the hoe with which he entered was locally produced, the one with which he came out was a foreign import (Mamdani 1985).

> Africa has to free herself from the yoke [..] of producing what it is not consumed by its people, and consuming what it does not produce. This makes Africa an exporter of low-cost raw materials, to be able to import finished or semi-finished products at very high costs. There is no doubt that Africa needs, and with extreme urgency, to de-colonize completely its economies, and to break clearly and totally with its colonial past of economical dependency (Adedeji 1985).

The term neo-colonialism has been coined to describe the economical dependence of developing countries on the world's industrialized economies. The conditions of this dependence are less obviously brutal than in colonial times (for instance, there is no trade of slaves), but they still produce severe consequences for the well being of the affected populations. Taghi Farvar (1976) offers an illuminating example:

> About 2 Kg. of cotton bring in 1.$ of foreign currency in Guatemala, of which 0.75 $, or three fourths, leave the country immediately to pay for the synthetic insecticides, fertilizers, spray-planes, etc. [..] as little as 1 or 2% of the cotton grown in Guatemala could probably bring in the same amount of net foreign exchange earnings as raw cotton exports, if finished products (say Guatemalan shirts) were being exported to the countries of destination. If these shirts and other finished products were made locally as a cottage industry using existent indigenous methods, the household economy would improve and no expensive capital outlay of foreign made machinery would be required. [...] Such an approach would also leave most of the area now devoted to cotton (the most fertile lands) free for other uses (such as food production), would prevent erosion and poisoning of the top-soil and would result in a more meaningful economic growth [and an uplifting of the] population, now badly fed and housed and in despicable conditions of health."

It can be argued that large scale trade and economic systems are the main avenue of oppression which maintain the misery and poor health - both physical and economical- of people in the developing world. In fact, the last decades have seen a progressive and accelerating "system capture and enlargement" (Brookfield and Kirkby 1974) by which small, low-risk, autarkic communities have been subsumed by large, high-risk economic systems. The latter can yield high profits, disastrous consequences or both (unequally distributed among the population). Most profits derive from the exploitation of natural resources. The modern "neutral" ethics of economic pragmatism promotes crops for a quick cash return, such as large-scale monocultures dependent on insecticides and fertilizers. Often times, these new schemes removed cultivations for local consumption. In the Sahelian south, cash crop plantations have crowded sedentary populations into less fertile areas, and restricted the nomads in their journeys. The traditional collaboration and exchange of products between peasants and pastoralists have suffered (Franke and Chasin 1980). In the Amazonian forest, palm oil plantations, oil companies and timber companies are destroying the complex and fragile environment on which the survival of indigenous groups depends.

Economic pragmatism has encouraged developmental programs of gigantic proportions, such as dams, irrigation plans, mines, deforestation of large areas for timber and for opening new land to agriculture. The impact of these programs on the ecology of the territory and human well being has been too often much more tragic than expected. Dams and irrigation schemes have provided electrical energy and water reservoirs, and allowed to cultivate newly irrigated land. They have also induced disastrous epidemics of schistosomiasis (a parasitic disease whose vectors thrive in the shallow warm water of irrigation schemes), and prompted huge ecological changes. For instance, following the entry in operation of the Aswan dam, the Mediterranean sea gained land from the Egypt coastline, some marine species nearly disappeared (the salinity of sea water has changed), and the regular fertilizing by flood of large areas around the Nile stopped (Rosenfield and Bower 1982; Heyneman 1984). Dams also dislocated large populations from their homelands, buried and destroyed archeological patrimonies, and led to the salinization of millions of hectares of land. Similarly, forests keep being exploited as timber mines, despite the severe problems caused by deforestation. Because of this practice, some most fertile but ecologically fragile regions have been already destroyed (Rich 1985). And the insecticides and herbicides now "necessary" to produce anything (with product losses higher than before their very introduction, see den Bosch 1980), are changing the ecological equilibrium of large regions (Linear 1985).

> The essence of pre-industrial indigenous societies is their variety and local adaptation. Each is tied to a specific habitat, and has evolved its cultural and behavioral expression. The wide variety of resulting human social forms is a response to an

> equal variety of habitats, each with a set of distinctive environmental constraints. In almost diametrical opposition, industrial technological development is characterized by a controlled, relatively uniform and highly simplified environment [...]. High levels of environmental pauperization and widely distributed homegenization characterize industrialized societies in all political and economic systems throughout the world. (Heyneman 1984)

An impoverished environment and an ecology far from equilibrium mean a decreased flexibility and an increased vulnerability of natural systems. People survive by becoming dependent on non-local inputs. The recent history of the Dominican Republic gives us a typical example. In 1953, the dictator Trujillo decided that the development of the country demanded the establishment of large sugar cane plantations. Thousands of families of the rural innerland saw their houses and fields destroyed from one day to the next, and were assigned to common barracks in state plantations. The sugar cane invaded the land, displacing the marvelous variety of local vegetation. After a period of high prices on the world market, sugar entered a crisis, as did the economy of the Dominican Republic. The rural population was left idle and helpless, their varied and generous environment destroyed by a monoculture completely dependent on the vagaries of international markets.

The example of the Dominican Republic throws light on the connection between economic development of a country and its political structures. Nearly everywhere, economic development strengthened the material basis supporting the national states and the people in power. This strength has frequently been used to finance the imposition of a military rule. In Africa alone, 25 states are under military rule, since 1960 there have been 90 overthrows of government and from 1976 to 1980 three and a half million people were killed in revolts and civil wars (Hettne 1985). On the other hand, *one can expect* that rapid processes of industrialization, accumulation of capital, disciplining of the labor force, eradication of the traditional economic and social structures and relative impoverishment of the social strata producing the economic surplus (peasants, for example) create fertile territory for repression and dictatorship. Some affirm in a very straightforward way that economic development planned and imposed "from above" is incompatible with true democracy, as well as with peace, joy of living, and the preservation of the cultural identity of the people (Esteva 1985). And some know that only with the help of repressive regimes can "development" and "civilization" be achieved.

Cycles of violent repression and rebellion in developing countries are a main cause of misery, ill health and death for enormous numbers of people. While the roots of internal unrest may be deeply seeded in peculiar realities of historical, ethnical, racial, and cultural nature, they have been made more acute by the changes induced by economic development. At the least, the development process offered the world superpowers an excuse to get involved in the internal affairs of the Third World. Following the Second World War, most struggles between East and West have been played out in the Third World, and development has offered a convenient justification for it. The numbers of people dislocated, wounded, disabled, tortured and killed in internal and external conflicts is of the order of millions. Moreover, wars devastate farmlands, and even in ecologically robust areas, fires and chemicals agents create long-lasting problems for vegetation and crops.

Low income economies devote to defense spending more than six times the percentage of total government spendings devoted to health expenditures (data of 1982, World Bank 1985). This may explain at least part of a recent finding: the countries with proportionally highest military spending also evidence the highest infant mortality rate (Woolander and Himmelstein 1985). Arms trade, a most prominent voice in international exchanges, well expresses the link between economic development and political violence. While increased export of resources (in order to buy weapons) nourishes the GNP growth, the imported weapons, used to fight internal or border wars, create misery for the locals. Most wars fought in the world in the last four decades took place in developing countries, many of whom are also known for bombing and killing their own people, using mass arrests, concentration camps and torture. The consequences of these practices for the physical and mental health of the people subjected to them - although most obvious and touching if one considers a single case - have yet to be properly understood in quantitative terms. In particular, it is not known how many people have been eliminated by concerted physical violence, economic exploitation and new diseases during the frontier expansion of the last two hundred years. Estimates of tribal depopulation from 28 to 50 million people are reported by Bodley (1982).

The strategy of survival of a community can be defined as that system of behaviors and productive practices which assures the community's existence and reproduction, and specifying its cultural and social identity. Any long-lasting system of interactions between the individuals and their hosting environment represents a particular strategy of survival, whose success if reflected in the health of the community. For instance, Andean communities have survived for centuries on a production system which takes advantage of the particular ecology of the territory, of labor subdivision within the family and labor sharing among families, of experimented behaviors and technologies in the face of agricultural risks, and of internal cohesion born out of the local culture (Sanchez Parga 1984). All these factors are important, and if only one is altered, the consequences for the health of the community cannot be foreseen. In particular, cultural change has direct repercussions on survival and health matters such as food, housing, reproduction, hygiene, care of diseases, child raising, marriage, etc. (Kroeger and Freedman 1984). In this sense, colonialism first, and economic development later, have negatively affected the survival and health of people by gradually destroying their built-in defense system (Rahnema 1983). They have corroded their culture.

Throughout the centuries, communities survived combining mental and behavioral resistance and adaptation to change. Yet, social change imposed in the name of 'development' has too often been violent (Bodley 1982), or manipulative:

> By ignoring the great wealth of unique relevant know-how and wisdom that each culture has generated throughout the ages for the preservation and development of its specific particularities and potentialities, 'developers' infantilize populations [...]. Learning is transformed into a scarce commodity called education, the production of

> which becomes the responsibility of the institution called school. Health is identified with Western medical products and science, which have to be provided through the development of medical facilities and training centers. Food becomes a commodity, outside people's life space, the production and the distribution of which become part of a development blueprint. [..] People who learned throughout the ages how to live relying on their own forces, become inhibited 'objects' of anonymous strategies which they often do not understand and on which they have no control. (Rahnema 1983)

Rahnema warns against the very concept of "development". As used today, this word is "corrupted language" and misrepresents reality. Instead of a process of self-liberation from various 'envelopes' of dependency, development has in fact inhibited the genuine unfolding of local lives and cultures. For Escobar (1985):

> At times, development became so important [..] that we accepted the price of massive impoverishment, of selling our resources to the most convenient bidder, of degrading our physical and human ecologies, of killing and torturing, of condemning our native populations to near extinction, so important that we began to think of ourselves as 'inferior', as 'underdeveloped', as 'ignorant', that we began to doubt the value of our own cultures and decided to pledge allegiance to the banners of reason and faith; so important, finally, that the realization of such 'development' clouded the awareness of the impossibility of fulfilling the promises that 'development' itself seemed to be making.

One may even wonder whether problems of hunger and poor health have not been waved around merely to generate "development" activities.

> Development writers often mistakenly attribute to tribal cultures the conditions of starvation, ill-health, and poverty, which are actually related to civilization and the industrialization. Self-

> sufficient tribal peoples do not belong in the underdeveloped category. [...] 'poverty' is a totally irrelevant concept in tribal societies, and does not result from subsistence economies per se. (Bodley 1982)

While being "helped" and "developed" the world's cultures are progressively homogenized into a common path (literacy, western-style education and health care for the few, foreign technologies, large-scale trade, industrialization, etc.). Although local folklore is highly regarded and preserved for the enjoyment of paying tourists, true cultural tolerance is uncommon. Most rulers of developing countries have been educated abroad, in western universities, and often the only allowance left to their original upbringing are colorful clothes in international gatherings. These people share the same behavior, attitudes and values of their "developed" models, and all pay allegiance to what Peter Berger (1982) calls the "religious category of development". Berger has called for an assessment of the human costs of developmental policies, in terms of pain and physical deprivation, and in terms of loss of life's meaning. This is a way of demanding that human health - be it physical, mental, or social - be first on the list of development concerns. It is also a quest for a different level of understanding problems, more related to the affected individuals and their ways of perceiving what health is about (Fuglesang 1982). In today's world, so powerfully dominated by technological grandeur and speed, there is a compelling tendency to allow abstract concepts and theories, and distant authority figures, to take charge of human lives. This happens not only, as usually throughout history, by stealing people's economic and political power, but also by pervading and controlling the intimate relationship between people and their environment, their community, their family and themselves.

> The quality of the lives of individuals [..] must be known by personal experience before any suggestions for change can be made. [...] suggestions for change should come from friends, not from distant 'thinkers'. It is time to stop ratiocinating about the lives of people one has never seen, it is time to give up the belief that 'humanity' (what a pretentious generalization!) can be saved

> by groups of people shooting the breeze in well heated offices [...]. (Feyerabend, 1987)

Who has the right to define problems and solutions if not the affected populations? Even seemingly "objective" definitions, such as human nutritional energy requirements, are questioned:

> ...the issue of energy requirement is so context and value dependent (..energy requirement for what? in what context? for how long? decided by whom? ..) as to exceed the limits of a purely 'objective', 'scientific', or 'medical' definition. It involves matters of power, be it the cultural and ideological power of deciding what is valuable, meaningful and prioritary, or be it the physical and factual power of 'shaping the context' in which resources, credit, land or food are distributed. [...] energy requirement is a political issue. [..] This is the most important research recommendation we can offer: that people be able to research their own situation themselves. (Borrini and Margen 1987)

The fourth current of thought on the determinants of health scarcity stresses the complexity of the strategies of survival and wellbeing of individual communities (for instance, their dependence on social ties, aliveness of culture, health of the environment), and calls attention to the development process (free or manipulative? Supportive or violent?). To the arguments of geography and climate, this perspective adds the dimensions of history and human management of the environment (is the land plundered or carefully managed? Whose interests are served by exploiting natural resources?), to the arguments of population pressure it adds the specificity of context (what population density would best balance local resources? What socio-cultural system and technologies would better serve the end of that balance?), and to the arguments of economic development it adds ethical and cultural concerns beyond mere economic considerations (who defines what development is about? What is a just price to pay for it? Who should pay that price? For whom has a technology to be "appropriate"?).

INTERVENTIONS

The reader will have by now realized that the four currents of thought just described intertwine and merge, and that they have been introduced mostly as an expedient to explore the debate on health and development. But although these currents do not exist as separate entities, their differentiation acquires meaning when we consider specific interventions promoted to improve health. The priorities and forms of these interventions reveal assumptions underlying an understanding of health problems which frequently fits one of the aforementioned currents of thought.

The current US administration affirms that improvements in the lives of the poor will follow from a sufficient stimulation of international trade, and an economic climate conducive to private investments and transfers of technology. The recipe for health improvement is economic growth, fostered by a political atmosphere which does not restrain or interfere with private initiatives in the international market place (Reagan 1982). The World Bank and the IMF put forth similar perspectives. The only altar they pay homage to is economic pragmatism: maximum financial return is the paramount goal of their policies, and social, ecological, demographic, ethical, health or aesthetic considerations are all secondary concerns. Accordingly, the adjustment policies promoted by the IMF and World Bank for developing countries in financial crisis have not addressed the issues of health and living standards of the population. On the contrary, austerity measures have at times withdrawn resources from public health programs. These measures have focused on the immediate financial cost of health care, not the human and social costs, nor the long-term financial costs, of not promoting it. For instance, Tanzania had to decrease national health expenditures in the early 80's in order to meet financial criteria.

Those who consider economic development necessary to improve the life and health of a population usually make a further assumption: improved health is a prerequisite for, or at least strongly favors, economic development. For instance, in terms of nutrition, development (increased food production) is good for health (better nutrition); in turn, better nutrition provides for healthier workers, able to produce more and thus sustain development. This argument may reveal itself to be a Damocle's sword for at least two reasons. First, the people most in need of support and interventions are not likely to be nor to become involved in tasks of a developmental nature. They are elderly or disabled people, children without family support, landless peasant families. Their primary concern is survival and self-sufficiency, achievements which are not likely to increase the country's GNP. Second, the increased productivity of modern technologies is greatly diminishing the need for human labor. This latter phenomenon, coupled with the sustained growth of human population, makes people increasingly more 'expendable' for purely economic goals. Thus, it is important that health advocates promote and pursue health not because it furthers economic development, but because health is a value in itself, and indeed a higher value than any "economic" development.

In the sixties and early seventies, concern for the demographic environment enjoyed a high-priority status in the international debate. The first World Population Conference, held in Bucharest in 1974, stressed the risks of uncontrolled fertility and the need for population policies. The World Bank and the USA were in the forefront among the sustainers of this opinion, and countries such as China started implementing impressive programs to curb the growth of their population. Lately, however, the "population pressure" argument has enjoyed lesser popularity. Some still affirm that first duty of a government is to stabilize its population at a level that will permit sustainable management of resources and a satisfactory quality of life (IUCNNR and IPPF 1983). Others, however, maintain that free enterprise and economic development can themselves take care of the pressure created by increased population. As rational economic agents, people will modify their reproductive habits when it will be in their economic self-interest to do so. This is the view of the current US administration, and it has been expressed in the second World Population Conference, held in Mexico City in 1984. Accordingly, bilateral US aid and international organizations in which the USA has a strong influence are now less prone to support family programs in developing countries.

At the opposite end of the political spectrum from the US administration, the IMF and the World Bank, are those who see economic exploitation and political oppression as root causes of human misery. They usually advocate a revolution by the masses to overthrow the present structure of power. Some call for popular violence against the "violence of the status quo" (Fanon, 1963), others for democratic, non-violent radical uncompromising action leading to liberation struggles and structural reforms (Gandhi 1922; Deming 1968). Some even believe that the very "modernization of poverty" and the increased vulnerability of human ecosystems brought about by developmental activities are bound to revive the struggle at the grassroots (Esteva 1986; Fals Borda 1985; Shiva 1985). Within the debate between violent and non-violent means are found the many voices advocating revolutionary change according to the historical circumstances of each region or country. The innumerable instances of liberation struggles in this century are living examples of this debate. In the last years, increasing popular support has sustained the movement of liberation theology, for which the path of spiritual fulfillment is based on personal and communal action and liberation in this world. Liberation theology regards socio-political, cultural, environmental and health matters as religious concerns. It secularizes spiritual commitments, and plays an active role at the community level in many developing countries.

HEALTH, DEVELOPMENT AND THE GRASSROOTS

In most of the enormous changes affecting their lives under the name of "development", people have been not the actors but the recipients (the target population!), and too often the victims. National planners of more or less totalitarian regimes, foreign aid experts, missionaries, business companies and military people have been at the rudder of projects and programs. Contrary to this, self-originated and self-reliant change has emerged as a viable pathway of genuine development (Freire 1970; Anderson 1975; Werner 1977; Max-Neef 1982; Werner and Bower 1982; Gran 1983; Ralston et al. 1983; Rahnema, 1983 and 1985; Hirshman 1984; Jackson et al. 1984; Esteva 1986; Fals Borda 1985; for specific examples see also at the end of the references under the entry of "periodicals specialized in alternative development"). Improvements in the health and social conditions of many communities in the developing world have started to express the will, the peculiarities, and the cultural sap of the affected populations. This has happened in an immense variety of forms and circumstances in what have come to be called grassroots movements and projects. These initiatives, born out of local organizing, tend to prosper wherever the country's government allows, or cannot avoid, some shift of control to local community.

Far from being an isolated phenomenon, local associations are today widespread in both developed and developing countries. They are the contemporary expression of that spirit of solidarity and cooperation which has sustained the evolution of the human race throughout the centuries (Kropotkin 1985). Nerfin (1986) has recently reviewed the multiplicity of forms and circumstances in which these associations appear, and has proposed to describe them with the term Third System. The role of the Third System is to face governmental power (the Prince) and economic power (the Merchant) and to help people assert their own autonomous power. Inherently a non-homogeneous body, the Third System works by networking and offering concrete alternatives to conventional institutions. The term "alternative" refers to the non-hierarchical nature of grassroot organizations, to their emphasis on solidarity, their sharing of power and responsibility, their flexibility according to varying circumstances and their willingness to experiment with unconventional practices.

A further aspect of the Third System, fostered by the intense networking, is the tendency to link issues. Health is a by-product of peace, freedom, personal security, ecological equilibrium and socio-cultural well-being. Working for health means working for these goals, which are human rights of the living and future generations. In this sense, health advocates should support ecologically sound practices, such as sustainable agriculture, cultivation of local plants, raising of local animals, and careful use of water, land, and wood. Health advocates should also support drastic cuts in nuclear and non-nuclear armaments, and the respect of political and social rights. In fact, some maintain that today the most important health task is avoiding war (especially nuclear war, see Adams and Cullen, 1981). This goes hand in hand with de-militarizing our societies and promoting the active participation of citizens in internal and external security matters (Thompson and Smith 1981; Thompson 1982; Sharp 1986). De-militarization would increase the "life expectancy" of the population of the whole planet by averting nuclear annihilation, would avoid large numbers of war-related casualties and environmental destruction, and re-direct resources towards health goals. In particular, de-militarization could be the prime ingredient of genuine development, severing the violently enforced ties of dependency on foreign powers, and allowing internal participatory democracy to flourish.

Grassroot movements tend to define problems and solutions differently than development institutions or national governments (in the words of Kothari [1986], "people are more important than the state"). Grassroots movements organize productive activities more grounded in the local technology, culture and traditions. The relatively small-scale at which these projects usually operate allows them to be easily absorbed into the biological and the social environment. Most importantly, when change is locally and democratically controlled, it has a better chance to benefit the people who pay the social costs of carrying it out (labor, environmental sacrifice, etc.). This is not the place to discuss, but just to mention the possible long-term political consequences of grassroot movements, which in many instances de facto promote decentralization of power, pluralism, and alternatives to state actors and institutions. Recently, umbrella organizations of grassroots movements (such as Locayan in India or the Asociacion Latino-Americana de Organizaciones de Promocion [ALOP] in Latin America) have developed. Their function is to connect local groups to exchange information, discuss issues of common concern, and support and protect an another in times of difficulty or harassment. These umbrella groups may grow in time to occupy at least part of the political space traditionally occupied by parties.

If local organizing is "the solution", is there any role for people in developed countries? In the past the accent has been on 'positive' aid (North-South transfer of food, technology, knowledge, etc.). Today, we may ask ourselves whether the developed and industrialized countries should not first of all remove the structures of oppression they still impose on the ex-colonial states (as in the Hippocratic oath "First, do not harm."). The intermingling of humanitarian aid, military aid, cash crop trade and weapons sales is being exposed, and the consequences of economic growth are re-considered. Beyond questions such as "What must grow?", people start asking "What must not grow? What should we forbid to grow? What should decrease?" (Eppler 1985). Or not only "What does economic development do for the people?" but also "What does it do to the people?" (Arns 1985). To answer these questions we do not need to investigate the relationship between health and development in an abstract and clear-cut way. Rather, we ought to allow the perceptions and the informed understanding of the affected people to take charge. People in developed countries may help with political action at home, but also by dispelling the myth that development and health are definable "objectively" and come as a package deal. Must primary health care really come with a side-order of radioactive waste?

Health is a culturally relative concept. It is closely related to human feelings and sense of identity, to the meaning ascribed to life, disease and death, and to the spirit and the customs of the community in which individuals live. These factors evolve with time, in the dynamic context of each society. In this sense, there is room to question even the health indicators which appear most unbiased and universally acceptable, such as infant mortality and life expectancy. There is room to question the establishment of permanent connections with relatively isolated and self-sufficient communities (building roads, airports, expanding of state infrastructures, etc.). There is room to respect seemingly irrational traditions, religious and contemplative attitudes, voluntary choices of poverty (where poverty may mean choosing self-sufficiency rather than being assimilated in a market economy) in the light of the sense of security and meaning they provide. There is room to support the human right of being different, and the social right of resisting change and "development", in order to reproduce specific traditions and specific cultural values.

"Development" denotes a powerful set of socio-economical transformations, which require the cooperation, and often the sacrifices, of most sectors of societies. It is meant to offer economic returns to all, but in practice its effects are much more complex. First, not all receive economic returns of improved goods and services. Second, not all assign the same value to them. Third, not all are equally affected in environmental, cultural or physical health terms. What if people in developing countries are disciplined and controlled by modern myths (health care, formal education, increased consumption, defense, etc.) while there is no chance that they will really benefit from them? What if in the meantime they are deprived of their own peculiar strategies of survival and wellbeing because of the imposition of different socio-cultural practices, or the degradation of the environment previously supporting their subsistence? What if they are in fact being lured into modernized poverty and new ways of being mentally and physically unhealthy? What if they are now losing their own traditional knowledge, slowly and uniquely developed, for the sectoral recommendations of professional self-appointed experts who have nothing personal at stake in making mistakes? Development should be a process of change promoting health for all. Such a process unfolds from the empowerment, rather than the disempowerment, of those whose lives it affects. It benefits the very people who pay the social costs of carrying it out (for instance with their labor, or the sacrifice of their immediate natural environment), and is meaningful for them. Such a development is ecologically sustainable and originates locally, because health is rooted locally, in the natural and cultural environment of the populations concerned. Indeed, health and development are linked at the grassroots.

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HEALTH IMPLICATIONS OF URBANIZATION

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Urbanization is a relatively recent worldwide demographic trend in the evolution of the human species. Fostered by the "Agricultural Revolution", urban settlements first appeared in the archeological record approximately 9,000 years ago, or within the latest one per cent of mankind's total existence (Hamblin 1973; Moorey 1980). Ancient and modern cities developed mainly because of economic and social advantages such as increased employment opportunities and the elaboration of cultural institutions, e.g. religious and educational facilities (Pfeiffer 1972). Urbanization has accelerated rapidly over the past century, especially in Third World populations. Now stimulated by the ongoing "Industrial Revolution", urbanization continues to be closely tied to economic development in countries throughout the world. While no definition of "urban" will satisfy all researchers, a large and densely compacted population is the single most frequently cited criterion in the literature. The United Nations defines a city simply as any community of 20,000 or more inhabitants (United Nations 1970), and this has been adopted by many researchers (Weinstein 1980:2).

The rapid growth of urban environments has been accompanied by a number of biosocial stresses that are producing a tremendous impact upon human biology and health (Carruthers 1976; Clegg and Garlick 1980; Glass and Singer 1972). The purpose of the present paper is to review the effects of urbanization on physical and mental health in the Third World. An attempt is made to identify biohavioral adaptations which aid survival in cities.

The Urban Environment

Urban environments are cross-culturally heterogeneous, especially with respect to conditions that may influence human biology and health. While some cities are characterized by extreme poverty and serious sanitation problems, others possess abundant resources and medical care facilities (Pacey 1978; Theodorson 1981). Regardless of location or variability or urban structure, however, adaptation to city life typically involves extensive exposure to noise stress, crowding, frequent crime, various forms of pollution, and a diverse assortment of diseases and public health problems.

Urban climates are generally warmer and more humid than the surrounding countryside (Bach 1972). According to Bryson and Ross (1972) precipitation is 20-30% greater, cloud cover is 5-10% heavier, and wind velocity is 20-30% lower in urban than in rural areas. Temperature and ventilation differences are related to the composition and arrangement of physical structures. For example, concrete and metal have relatively higher capacities for heat absorption and thermal conductivity than soil and plant life (Bryson and Ross, 1972). In addition, urban buildings trap air and inhibit wind flow.

Urban dwellers face exposure to a number of other hazards which potentially threaten health and well-being. Boyden (1972) estimates that one-half million different chemical substances, many of which are undegradable, are released daily into the world environment as a result of the metabolism of cities. On a worldwide basis, city water supplies are typically contaminated by human and industrial by-products (Briscoe 1986; Russell 1978). Ionizing radiation loads are greater in urban than in rural environments (Eisenbud 1984). Besides particulate pollution, urban air has a relatively high content of carbon dioxide, carbon monoxide, sulfur dioxide, and hydrocarbons (Abend 1971; Boyden 1972). In recent years many urban neighborhoods have been blighted by trash accumulation and the decay of housing and other structures. Disposed solid wastes amount to one ton per capita annually in cities around the world, and paper, metal, rubber, plastic, glass are the most prominent (Abend 1971). Other potentially dangerous stresses and hazards affecting urban adaptation are described by Briggs (1983), Brown (1985), Harriss et al. (1978), Jerimer (1982), Merry (1981), Kalt and Zalkind (1976), and Torry (1979).

Urbanization has played an integral role in the ongoing worldwide "demographic transition", which encompasses rural-to-urban migration accompanied by fertility and mortality changes and substantial modifications in household structure and the human life cycle (Boyden 1972; Kirkby 1985; Nelson 1976). Urbanization is associated with evolving patterns of fertility, child growth, migration, mate selection, morbidity, aging, and mortality.

In general, cities have rapidly grown because of immigration more so than internal reproduction. A sizeable volume of investigations suggests that fertility is depressed in urban societies. In comparison with rural control populations, birth rates and completed fertility are lower in cities in various countries including Jordan, Jamaica, Korea, Costa Rica, Mexico, Venezuela, Puerto Rico, Colombia, Argentina, and Guatemala (Ahmad 1985; Bogin and MacVean 1981; Davidson 1973; Farber and Lee 1984; Downing and Yaukey 1979; Halberstein and Crawford 1972; Lee and Farber 1984; Stinner and de Albuquerque 1980). Important factors are later age at first marriage, delayed childbirth and intentional birth spacing because of wider availability of contraceptives, elevated occurrence of induced abortion, higher employment rate of adult females, larger proportion of single adults, crowded housing and more frequent change of residence, and possible adverse biophysiological aspects of the urban environment. In the Philippines Stinner (1977) discovered larger average household size in urban areas despite lower fertility rates, due primarily to the increasing formation of extended family and non-relative dwelling units. Nag (1980) points out reasons why "modernization" may in certain cases actually lead to gains in achieved reproduction--improvements in nutrition, reduction in reproductive wastage (including spontaneous abortion), less common breast feeding, and more frequent rate of remarriage following separation or death of spouse.

Mortality patterns in urban populations are quite variable. On one hand, crowding and sanitation problems promote contagious diseases and the persistence of childhood mortality, while on the other hand cultural adaptations such as modern medicine and piped water contribute to improved hygiene and extended longevity, such as in Brazil and Sierra Leone, Africa (Mills 1967; Shimada 1981). Thus, falling mortality rates characterize a number of Latin American cities (Carvajal and Burgess 1978; Halberstein and Crawford 1972), but mortality remains relatively high in urban India because of chronic diseases related to population density (Gurkaynak and LeCompte 1979). In developing nations infant mortality rates (annual deaths under one year of age per 1,000 live births) are generally lower in urban compared to rural areas, such as in Morocco, Tunisia, Chad, Pakistan, Turkey, and the Philippines (Basta 1977:117).

With respect to urban nutrition, a number of studies suggest that growth and development are more rapid in urban children, leading to relatively earlier maturation as measured by the timing of menarche, the appearance of secondary sexual characteristics, and rural-urban body size comparisons. For example, Tanner and Eveleth (1976) and Meredith (1979) report that youngsters are taller and heavier in urban areas of Africa, Asia, and Central America. In Latin America rural samples generally display growth deficits when compared to their urban peers (Bogin and MacVean 1978, 1983; Graham et al. 1980; Greska et al. 1984; Johnston et al. 1985; Malina et al. 1981; Meredith 1979). Corlett's recent study (1986) of the growth of 721 African children revealed that urban youngsters were taller and heavier than their rural counterparts but were still smaller than age-matched European and American children. The correlation between ethnic background and growth variations underscores the genetic component in developmental patterns (Malina et al. 1981).

Urbanization, however, is also associated with nutritional stress in the form of undernutrition (overall shortage of sufficient calories and/or nutrients) and malnutrition (deficiency of specific nutrients). Austin (1980:12) tabulates eight Third World countries in which average daily per capita caloric intake is lower in urban than in rural regions: Pakistan, Brazil, India, Thailand, Trinidad, Chad, Korea, and Indonesia. The same author makes the following statements:

> Malnutrition is simultaneously an especially severe contributor to, and consequence of, the urban poverty syndrome...The incidence is accelerating more rapidly in urban areas. Furthermore, the degree of malnutrition among urban dwellers is frequently more severe than among their rural counterparts (Austin, 1980:6).

Conversely, there are many cities where nutritional status is better than in the surrounding countryside, such as in Africa (Mills 1967; Vorster 1977). Complicating the picture further is the fact that intra-urban differences are often greater than urban-rural differences in Third World countries (Basta 1977).

Considering the history of human nutrition, dietary behaviors are unique in urban populations. Industrialization and rapid population growth have led to the consumption of less "natural" foods in favor of more packaged, artificially preserved, and synthetic foods. It is not realistically possible for every person in a city of one million or more to have access to fresh food each day. Beside the matter of convenience, increased reliance upon "junk" (low nutritional value) and "processed" (chemically treated) food is also a function of taste preferences influenced by culture. Overnutrition, which includes obesity and the excessive intake of alcohol and drugs, is historically more of an urban phenomenon (Fernandes-Costa et al. 1984). Serum cholesterol and triglyceride levels are typically higher in urban samples as a direct consequence of greater dietary intake of total fat and a variety of fatty acids (Garcia-Palmieri et al. 1977).

Nutritional surveys of urban populations have also uncovered a number of instances of specific nutrient deficiency, including iron, phosphorous, folate, potassium, fiber, protein, carbohydrates, and several vitamins (Basta 1977; Fernandes-Costa et al. 1984; Gilat et al. 1985; Newcombe 1977; Ward and Sanders 1980; Pickering 1985).

Cities in Third World countries differ from cities in technologically advanced nations in many aspects of environment and culture that influence health. For example, the biomedical threat of industrial pollution is not as great today in Third World cities, but these same cities possess fewer "modern" medical facilities. Third World cities are also individually unique with regard to natural resources, economic structure, and exposure to parasites and other health hazards (Tulchin 1986).

The Biological Impact of Urban Hazards and Stresses

Besides potentially harmful weather conditions and problematical nutritional resources, the urban environment is also distinguished by crowding, noise stress, and pollution. Recent research indicates that each of these factors has important biomedical effects on the human body. It should be noted that many of the findings in this area have been obtained in industrialized cities and may not always be fully applicable to Third World cities.

Crowding is an inevitable accompaniment of urban life which is related to a number of serious biosocial stresses. Animal and human data indicate that mankind is the most crowded of all species (Davis 1971), and that human reactions to overcrowding are remarkably similar to other animals (Freedman 1980). Many investigators believe that the persistent crowding of people, such as in apartment complexes, streets and highways, offices, hospitals, and various other urban contexts, is at least partially responsible for increased levels of noise, pollution, aggression, crime, psychological disturbances, social disruption, a variety of medical disorders, and even child abuse (Baum and Epstein 1978; Freedman 1980; Gurkaynak and LeCompte 1979; Kirmeyer 1978; Sobal 1979).

According to recent research, human physiological changes arise in connection with crowding. One consistent finding is heightened adrenal activity and elevated blood pressure (Davis 1971; Evans 1979; Factor and Waldron 1973; Stoll 1973). Other studies have recorded crowding-related changes in respiration and perspiration, as well as modifications in the function of a number of body parts, such as the liver, spleen, kidney, pituitary gland, skin, stomach, hypothalamus, and reproductive organs (Davis 1971; Epstein 1980; Factor and Waldron 1973; Stoll 1973).

Crowding stress is also manifested in measurable alternations in behavior and psychological characteristics. (Epstein 1981, 1982; Ehrlich and Freedman 1971; Kirmeyer 1978; Zlutnick and Altman 1972). Current evidence illustrates that the extreme crowding in densely populated cities such as is common is Third World countries comprises an "unnatural" condition that threatens human health and survival. As mankind increasingly evolves into more of an indoor species, biological and psychological adaptive problems will undoubtedly be compounded in the future (Cassel 1972).

Noise, often defined as undesired or disagreeable sound (Cohen and Weinstein 1982; Kryter 1970:1), represents another element of urban life that threatens human physical and mental health (Welch and Welch 1970). The harmful effects of excessive noise upon human auditory organs range from temporary hearing loss to permanent deafness. Many routine urban noises, especially those emitted by vehicles and construction equipment, have loudness intensities far above recommended safe maximums (Benarde 1973:275; Weinstein 1980:33). It is thus not surprising that rural residents generally score better on hearing tests than matched urban samples. Recent research has also established a link between long-term noise exposure and the retardation of human growth and development. Ontogenetic modifications have been observed throughout the developmental cycle from reduced fetal size to delayed maturation (Schell 1981; Schell and Hodges 1985; Schell and Norelli 1983). Noise stress, like growing stress, is related to violence and aggression. It may also lead directly to fatigue and higher probability of early mortality (Cohen and Weinstein 1982).

Pollution, broadly defined as environmental contamination, is perhaps the most ominous roadblock to successful survival in cities. Throughout history large populations have faced major challenges in waste disposal and in the acquisition of safe foods and drinking water. In today's urban environments excessive amounts of pollutants and other toxic poisons are typically found in all vital resources--air, water, soil, and food (Randolph, 1976). Urban pollution is closely tied to human biology and health, as evidenced by the fact that morbidity and mortality rates are directly correlated with measurable levels of pollution (Nurnberg and Vigneon, 1985; Waldbott, 1978).

Water pollution is caused by a number of factors including radioactive fallout, the release of particulate matter into the atmosphere, sewage discharge into natural waters, and the dispersal of harmful chemicals such as mercury and lead (Boughey 1975). Viessman and Hammer (1985:234) list 129 different toxic pollutants commonly detected in urban water supplies. Numerous attempts have been made, with varying degrees of success, to treat water with chemicals and filtration devices, sometimes with unforeseen results. For example, chlorine has been utilized for many years to destroy bacteria, but it has potentially mutagenic effects in the human body (Russell 1978).

Urbanization is also responsible for the consumption of increasingly polluted air in urban areas. Impressive statistics have been compiled which prove that air pollution is damaging to the human body. During inversion periods there is a significant increase in death rates, hospital admissions and doctor visits, and the initial incidence of various diseases, especially respiratory and cardiovascular disorders and lung cancer (Ostro 1983; Goldsmith and Friberg 1977; Stewart 1979; Lave and Seskin 1970). Other diseases directly associated with biological changes caused by air pollution include coronary heart disease, vascular disease, stomach cancer, renal disease, ocular and auditory disorders, emphysema, bronchitis, pneumonia, tuberculosis, asthma, sinusitis, and a variety of allergic conditions (Lave and Seskin 1977; Coffin and Stokinger 1977; Gardner 1982).

Cities of the future are expected to experience unprecedented pollution and related health problems. Oil spills, pesticide poisonings, nuclear waste dumpings, gas leaks, air pollution alerts, food poisonings, photochemical smogs, defoliations, water contaminations, toxic chemical exposures, factory smoke deposits, and other "modern problems" will likely be encountered with greater frequency in the future (Harris et al. 1985; Hinkle and Loring 1977; Sharp et al. 1980; Weiss and Clarkson 1986). It will be necessary to closely monitor and control pollution in order for people to be able to eat, drink, and breathe with a reasonable amount of safety.

Urbanization and Disease

Urban morbidity is epidemiologically unique owing to the stress factors discussed here -- adverse weather conditions, crowding, noise, unusual nutrition, and pollution. On one hand, various diseases are the direct result of certain urban-specific conditions (e.g. Briscoe 1986; Christiani 1984), while on the other hand technologically advanced medical resources and facilities are more available in cities (Greer and Greer 1983; Weinstein 1980).

Several diseases exhibit higher incidence and prevalence in urban than in rural populations. Degenerative disorders such as coronary heart disease, cancer, ulcers, and liver cirrhosis are all influenced by pollution, diet, and other urban conditions. In a recent study of mortality trends in the Brazilian state of Rio Grande do Sul, Shimada (1981) discovered that in the Porto Allegre metropolitan area overall mortality rates are falling, but the number and proportion of deaths due to ischemic heart disease, cerebrovascular disease, respiratory tract cancer, and breast cancer are relatively high compared to rural regions. Cancer of the digestive system (esophagus, stomach, intestine), however, is relatively more lethal in farming communities because of the dietary practices of excessive salt intake and the heavy consumption of a potentially carcinogenic tea. Heart disease mortality is prominent in cities due in part to higher blood pressure and blood free fatty acid (FFA) values that have been reported for urban residents (Carruthers 1976; Factor and Waldron 1973). Heart/cardiovascular disease is the leading cause of death in urban areas of The Sudan (Herbert and Hijazi 1984). Cancer susceptibility is also closely linked to the pollution of urban environments. On an international scale cancer is more prevalent and more lethal in cities than in the countryside, especially lung and digestive tract cancers (Greenberg 1983). Ample research has now proven that certain chemicals commonly contained in air, food, and water have carcinogenic effects in the human body (Eisenbud 1978). Christiani (1984) attributes the dramatic rise in lung disease, cancer, and heavy metal and industrial chemical poisonings in China to urbanization and the consequent buildup of harmful wastes in the workplace. Since coal is the major energy source in China, pneumoconiosis is increasing in prevalence. It was detected in 4.2% of miners in one province studied. Between 3-5% of miners and factory workers exposed to silica-containing dust have developed silicosis. In recent years pesticide poisonings, hypersensitivity pneumonitis, occupationally-related cancers, and lead and asbestos poisonings have been frequently reported in China. A recent study of a large asbestos products factory in Shanghai revealed asbestosis in 20% of the workers (Christiani 1984).

Infectious diseases also pose a threat to urban health. Crowding and concentrated population density favor the rapid contagion of a number of infections in cities, such as sexually transmitted diseases, tuberculosis, measles, pneumonia, hepatitis, influenza, and the common cold (Factor and Waldron 1973; Hunter and Thomas 1984; Johnson 1964). The substantial prevalence of endemic respiratory infections is partially explained by the fact that ozone, nitrogen dioxide, and sulfur oxide in urban air supplies are known to cause pathological alterations in the respiratory tract (Coffin and Stokinger 1977; Gardner 1982). Malaria is the most commonly reported disease in urban Sudan, accounting for over 25% of hospital patients surveyed in three cities by Herbert and Hijazi (1984). In their review of epidemiological trends since 1900 in Africa, Hunter and Thomas (1984:57) conclude that "Tuberculosis is promoted by urbanization." According to Ebrahim's (1984) survey, epidemics of certain infectious diseases have been especially common in warm climate cities in Africa, Asia, and Latin America, including cholera, dengue, haemorrhagic fever, leishmaniasis and filariasis. Pointing to the need for improved sanitation and more effective immunization, the same author reports that childhood infections (measles, whooping cough, polio), roundworm infestations (e.g. Ascaris and Trichuris), and other gastro-intestinal parasites (e.g. Salmonella and Shigella) are more prevalent in urban than in corresponding rural populations of India, Bangladesh, Indonesia, and the Philippines. Ganapati (1983) reports that the incidence of leprosy in India is greatest in congested urban slums. By contrast, in Africa Hunter and Thomas (1984:27) discovered "a negative correlation between leprosy and urbanization."

A variety of other urban diseases and public health problems are sometimes attributed to aspects of city life, varying from drug addiction to mental illness, varicose veins, gall bladder disease, postural disorders, injuries from motor vehicle and industrial accidents, liver amyloidosis, alcoholism, anencephalus, and visual defects (Angle and Wissman 1980; Hiernaux 1984; Hunter and Brunn 1974; Stoll 1973; Yawney 1983). In a sample of children aged 12-16 from India, Hendel et al. (1983) discovered "significantly better visual acuity in rural youths than in urban youths." In a thorough comparison of societies around the world, Post (1982) likewise uncovered a negative correlation between visual acuity and degree of urbanization. Due to "selection relaxation" visual acuity is sharpest today in hunting-and-gathering populations and weakest in the most industrialized cultures. Recent research indicates that dental malocclusion is more prevalent in urban populations, mainly because of the consumption of processed foods and greater occurrence of caries in deciduous dentition (Corruccini 1984; Corruccini and Choudhury 1986). Clegg and Garlick (1980), Rees and Purcell (1982), and Trowell and Burkitt (1982) have assembled extensive data on the association of urban factors with disease epidemiology.

It must be cautioned, however, that not all rural-urban epidemiological differences are due to urbanism *per se*. As Weinstein (1980:11) points out, "It is difficult to interpret data on city and country differences in health because factors other than urbanization may be causing the differences. For example, urban-rural differences may result from the fact that people who live in cities are older on the average than their rural counterparts."

In addition to new disease patterns, urbanization has also led to changes in health care. Traditional medicine has persisted in urban societies (Davidson 1983; Dobkin de Rios 1981; Press 1978; Wirsing 1985), and the spread of "Western" medical practices and treatments has allowed for multiple avenues of health care in many parts of the world (e.g. Coreil 1980; Durkin-Longley 1984; Heggenhougen 1980; Herbert and Hajazi 1984). One interesting finding in research on the evolution of medical care is that many populations experiencing acculturation express a clear distinction between diseases which would be best handled by clinic exams and "modern" medicines and, on the other hand, those diseases more treatable by traditional medical practices and medicinal plants, such as is the case in Nepal, Taiwan, Zaire, and the Bahamas (Durkin-Longley 1984; Halberstein and Davies 1979; Kleinman and Gale 1982; Mahaniah 1981). Other investigations suggest that significant ethnic variations exist in health-seeking behavior, prescribed treatment regimens, and attitudes toward health and disease in metropolitan areas (Low 1981).

Urban stresses also exact a toll of mental health. The classic study by Faris and Dunham (1960) shed light on this fact by showing that diagnosed psychiatric disorders, mental hospital admissions, crime, drug abuse, and "deviant" behavior occur more frequently per capita in urban than in rural populations. In a review of more recent literature Basham (1978:145) makes the following statement: "A significant body of literature suggests that urban life either promotes or is associated with higher levels of suicide, crime, and mental illness than exists in non-urban areas". The field studies by Dawson (1964) and Chu (1974) in African and Chinese cities illustrate the role of rapid urbanization and attendant culture change in mental illness etiology, pointing to change of residence, medical problems, crowding, and exposure to competing values (e.g. religious, political, etc.) as agents of stress. Within cities the prevalence of psychological disorders is statistically correlated with population density (Hunter and Brunn 1974). According to some investigators the multitude of sensory stimuli in cities is difficult to process properly by the human nervous system, leading to neurological adaptations such as the selective screening of stressful inputs and reduced attention span (Milgram 1970; Wohlwill 1975).

Violent crime, an indicator of psychosocial stress, is predominately a phenomenon of large cities. Freedman's (1975:56) data show that the rate of felony crimes (murder, rape, armed robbery, kidnapping, terrorism, etc.) is over ten times greater in cities than in rural areas around the world. Voluminous field studies support the association of urbanism and crime, many citing the influence of crowding, socioeconomic stress, pollution, noise, and structural problems such as inadequate lighting (Harries 1973; Lee and Egan 1972).

It might prove difficult to generalize the present findings to all of the great variety of Third World cities. Many of the cited baseline data on the biological impingements of urban environments have been obtained from subjects from technologically advanced nations. It cannot be assumed that the urbanization experiences in long-industrialized countries will simply be repeated in developing countries. There are unparallel situations in the nature and enforcement of city zoning and building codes and statutes, the activities of multinational corporations, health care delivery systems, and sanitation services (Lee 1985; Pacey 1978; Richards and Thomson 1984). Herbert and Hijazi (1984:342) estimate that "as much as 40-50% of diseases found in Third World countries are related to low quality environments and are controllable."

In addition, there are numerous instances in Third World populations of misapplication of adaptive technologies originally developed and tested in advanced countries. By way of example, the improper treatment of drinking water with faulty chlorination procedures has directly lead to diarrhea and other health problems in Colombia and Bangladesh (Bersh and Osorio 1985; Levine 1976). Unforeseen environmental hazards resulting from technological development have also been responsible for increases in a number of nutritional and infectious diseases and other public health problems in Africa (Hughes and Hunter 1972). In Guyanese cities the incorrectly supervised delivery of "Westernized" health care services has hindered medical modernization. By prejudiciously misreading ethnic and religious variations in health needs and attitudes, primary care workers have actually contributed to resentment, resistance, and the reactionary rejuvenation of "folk" medicine (Fredericks 1986).

Future Prospects

The stresses of city life are affecting human health and disease by causing changes in fertility, mortality, growth, nutrition, physiology, mental illness and health care. Demographic, economic, and ecological barometers indicate that urban adaptation will be even more challenging and difficult in the future. World population is growing at an alarming pace, and rural-to-urban migration is continuing on a large scale. In addition to the intensification of crowding, noise stress, pollution, crime, and disease, adaptive problems will certainly be compounded by the overconsumption of energy, the projected shortage of food, and the concomitant depletion of natural resources. On the optimistic side, scientific research and seemingly unlimited human ingenuity may well prevail and solve these pressing survival problems and improve the quality of life in future cities. It is possible only to speculate about adaptive biological traits which may evolve through natural selection. Resilient digestive, respiratory, and nervous systems will undoubtedly have high survival value. Thus, people of the future might well possess "cast-iron" stomachs and lungs, heightened sensory capabilities, and increased nervous tolerance to psychological stress. As further gains are achieved in human longevity in the Third World, artificial body organs and replacement parts will become more common there, including false teeth, glasses and contact lenses, hearing aids, hairpieces, implantable devices such as pace makers, and internal prosthetic organs made of silicon and plastic such as hearts, stomachs, colons, blood vessels and kidneys.

Many cities around the world have designed and enacted various measures in an attempt to manage the environmental crisis and control inherent biological hazards. Positive results may be realized in the future from the following actions: population regulation through birth control and urban planning, effective anti-noise and anti-pollution laws, elimination of toxic wastes, efficient disaster warning systems and survival training, new guidelines and equipment to reduce traffic and industrial accidents, synthetic foods and fuels, automated health care, and the technological reconnaissance of diseases and their risk factors. It is distressing to point out, however, that many of today's world cities are inadequately equipped to effectively prepare for natural disasters and that most urban people are unfamiliar with the fundamentals of survival training (Sorenson 1983). Urban renewal and revitalization projects comprise an essential step toward the protection of the physical environment and the maximization of health and longevity. On the other hand, if the biosocial stresses of city life persist unabated, human welfare will be increasingly threatened and reverse migration to suburban communities might become a necessary alternative.

Due to its recency, the total biomedical impact of the ongoing urbanization "experiment" may not be fully understood for years to come. The unique ecology of urban environments deserves close monitoring and possible modification in order to improve the quality of life and maximize the potential for successful survival in cities. This is especially urgent since Weinstein (1980:xiv) estimates that over 70% of the world's population will live in cities by the year 2000. Hopefully, the final advantage will belong to the human species because of its future orientation--the ability to foresee problems coming down the road. Immediate action is strongly recommended, especially in the form of applied field and laboratory research in different societies throughout the world.

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PHARMACEUTICALS

DRUGGING THE PEOPLE: PILLS, PROFITS, AND UNDERDEVELOPMENT IN NIGERIA

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> The more fundamental question is whether their (multinational pharmaceutical corporations) positive contributions are not in fact outweighed by, and are incidental to, the damage they do and the bad health care they promote; in economic terms, whether the resources they have captured could not generate more benefits to their consumers if applied in other ways.
>
> Muller 1982:19

INTRODUCTION

Drugs are essential components of Western medicine. In a simplified version, a core theory of Western medicine is comprised of germs and intervention with drugs with the objective of destroying the germs while magically sustaining the host. Beyond, perhaps because of, this perceived indispensability to Western medical practice, drugs are now presented as cure-alls, marketed and consumed without checks in Nigeria. But drug marketing and usage are hardly always this necessary, benign or in good faith. To the contrary, drug marketing and usage are often characterized by misrepresentation by drug companies, misprescription by physicians, and/or consequently, misuse by the consuming public (Silverman 1976; Gustafson and Wide 1982; Silverman and Lee 1974; Melrose 1982; Muller 1982). Why are consumers left at the mercy of the drug industry?

This essay examines the above issues about the drug industry in Nigeria. We first document the magnitude of the drug industry and the major outlets to the public, after which existing regulatory mechanisms are reviewed. Then, the reasons why regulatory mechanisms are ineffective as well as the implications of an unregulated drug industry for health hazards and national health policy are discussed.

In pursuit of these stated objectives, field work was carried out in Plateau State. We conducted observation of drug promotional activities in ten markets as well as informal interviews with hawkers, detail persons and officials in regulatory agencies who consented to be interviewed. We took advantage of the annual meetings of Plateau State Pharmaceutical Society of Nigeria (PSN)--held in September, 1986--which provided an opportunity both to meet difficult-to-track detail person and also to glean from the deliberations, the general perception of the drug problem. Field work was supplemented by research of published literature from other parts of Nigeria, and we were able to confirm that the drug situation (supplies, marketing, usage) in Plateau State is by no means unique. The findings from the field work therefore, reflect the situation elsewhere in Nigeria.

THE DRUG INDUSTRY AND DISTRIBUTION IN NIGERIA

It is trite but true to state that accurate data on most aspects of Nigeria's social life are unavailable. What we have are estimates, what Dianna Melrose (1982) calls "guesstimates." Data on drug production are no exception. Estimates of Nigeria's self sufficiency in drugs range from 5 to 10% of total needs (Muller 1982:91; Melrose 1982:29; Piachaud 1980). Stated differently, Nigeria is 90 to 95% dependent on imports for her drug needs, unlike other third world countries like Brazil and Egypt who produce most basic drugs locally.

The nature of even this small percentage of local manufacture in Nigeria needs to be qualified to better understand the true picture. Rather than lead to self reliance, this so-called local manufacture has, ironically, increased the dependency burden. This is because, in the words of a one-time Health Minister "almost 100% of the raw materials used in the so-called drug manufacture meant simply local mixing and packaging" (Anonymous 1982:2). Indeed, as Efobi (cited in Oculi 1981:159) has illustrated in the case of aspirin, "the only locally obtained raw material in the process for local manufacture of aspirin tablets is water" the pump of which, not to mention the chemical for treatment, might well have been imported. It is noted that the heavy reliance on imported raw materials is an essential feature of the structural disarticulation of Nigeria's national development and the major bane of the political economy of peripheral capitalism (NDP 1981:40; Thomas 1981; Amin 1978; Onimode 1983).

Besides the foreign exchange requirements for raw material importation, this type of manufacture has no linkages with other sectors of the economy, for instance, petrochemicals. Furthermore, local drug manufacture has become an avenue for multinational drug companies (MNDC) to repatriate profits. Peter Schurch, the marketing manager of Hoffman La Roche, is indiscreet about this fact: "In many countries, you cannot take profits out but you can take (profits) out in active substances (imported for drug manufacture)" (Muller 1982:96). Yet, Nigeria's health policies since independence, as elaborated below, have essentially been limited to hospital construction and procurement of drugs for medical care. Nigeria has allocated huge amounts to health care. The Fourth National Development Plan clearly illustrates how the lion share of these allocations are religiously devoted to curative medical care; for example, during the 1974-80 period only 16% of the health budget was allocated to basic and preventive care (NDP 1981:272).

Because of its population of about 100 million people, affluence (mostly through oil), and the low capacity of local manufacture, Nigeria is the biggest drug market in Africa. The major MNDCs have business here and engage in a countervailing scramble for a share of the market. As Table 1 shows, the Nigeria drug industry is dominated by Switzerland, U.S., and Britain. As the turnover and figures in Table 2 indicate the drug industry in Nigeria have large profits even with declining turnover.

The unethical promotional activities of drug companies, e.g. misrepresentation in several developing countries, have been reported by various authors (Silverman 1976; Melrose 1982; Gustafson, and Wide 1981; Laff 1977; Piachaud 1980; Glucksberg and Jack 1982; Barnett et al. 1980). Could the same be said by Nigeria? In the remainder of this section, we discuss major drug outlets in Nigeria as well as the promotional activities.

Drug outlets in Nigeria could be broadly categorized into: 1) hospitals, dispensaries and other treatment centres, 2) chemist shops and pharmacies, 3) itinerant and non legal dealers, and 4) medical representatives (detail persons). These various outlets differ both in the way they operate and in promotional activities. They, therefore, merit some detailed discussion.

Hospital and dispensaries. These are the most traditional, and perhaps respected, drug outlets in Nigeria. Their high status and association with drugs may be traced to the origins of hospitals in Nigeria. Here, hospitals started as treatment centres for sick European traders (Schram 1971; Ityavyar 1986), in contrast to hospitals in the West (Friedson 1963) where custodial rather than curative emphasis was the predominant philosophy. In keeping with the curative emphasis, hospitals in Nigeria have continued to be centres for administering drugs. This is the conception of hospitals articulated in health policy documents and which has, at the

TABLE 1

MAJOR MULTINATIONAL DRUG COMPANIES OPERATING IN NIGERIA

COMPANY	ORIGIN
Hoechst	German
E. Merk	German
Pharma-Deko (Parke-David)	American
Pfizer	American
UpJohn	American
Bayer	American
Squibb	American
MSD	American
Johnson and Johnson	American
Dumex	Danish-French
May and Baker	British
ICI	British
Beecham	British
Glaxo	British
Major & Co.	British
Boots	British
Sandoz	Swiss
Hoffman La Roche	Swiss
Wellcome	Swiss
Ciba-Geigy	Swiss
Ranbaxy Montari	Indian

TABLE 2

TURNOVER AND PROFIT FIGURES OF SOME MNDCs IN NIGERIA

	1983	1984	1985	1986
Hoechst				
Turnover		47,613	33,487	
Pre-Tax Profit		5,615	2,752	
Boots				
Turnover	9,840	6,105		
Pre-Tax Profit	1,017	51		
Glaxo				
Turnover		35,889	31,574	
Pre-Tax Profit		7,428	5,823	
Pharma Deko				
Turnover	9,068	907	974	
Pre-Tax Profit	250	165	175	
Beecham				
Turnover			30,214	41,827
Pre-Tax Profit			15,279	17,308

SOURCE: Based on figures published in the *Business Times* same time, become incorporated into Nigerian languages. Hence, the word for hospitals in many Nigerian languages (like Ibo, Idoma, Tiv) is simply "house of medicines."

Beyond this legacy, drugs have become central to the patient-practitioner encounter and Western (allopathic) medical practice in general. Hardly is there a consultation which does not end with a prescription. Whether public or private, hospitals and dispensaries often have the right personnel and are centres where one is mostly likely to receive the right prescription and consequently, the right drug (Alubo 1986c).

Except for imposing sign posts which increasingly list the array of services provided, hospitals in Nigeria do not advertise. Drug advertisement is also subtle, such as the glossy drug posters and calendars found commonly in Nigeria hospitals. Free samples are also distributed to doctors and pharmacists who, rather than the consumers, are the targets of drug promotions, perhaps because they are the ones who influence drug purchase and distribution.

Chemist shops and pharmacy. Chemist and pharmacy stores are the most predominant businesses in urban Nigeria, second only to the beer business. In Jos, for example, there are hardly any streets without numerous medicine stores. Though grouped together for present purposes, the legal provision for chemist and pharmacy shops differ.1 The former are restricted to common remedies (over-the-counter), and cannot deal in prescription (ethical) medicines; only pharmacies can carry prescription items. Both are forbidden by law to prescribe drugs.

Chemists and pharmacies in Nigeria are, in practice, not restricted by legal provisions (discussed below) governing drugs. Not only are prescription drugs such as antibiotics (*capsules*) available over-the-counter, but both do in fact engage in what Bode Ladejobi (quoted in Muller 1982:91) has called "counter-prescribing". The role of the druggist long observed in Regionville by Koos, is a clear pattern:

> ...was limited by law but his place in the community suffered no such limitations. Legally he could fill prescriptions and dispense patent

> medicines and proprietories. By custom, however, he became something of a diagnostician and prescriber of therapy in his own right (Koos 1954:86).

Because of this discrepancy between legally stipulated and actual roles, chemists and sometimes pharmacies are frequent targets for raids by drug enforcement agencies.

Both chemists and pharmacies engage in advertisements especially in the print media. Many of their business names are in themselves advertisements. Names like "Health", "Progress", "Hospicare," "Sauki," (Hausa for thrifty) are some of the self selling names in the Jos area. The primary business targets of chemists and pharmacies are the consuming public.

Itinerant and non legal dealers. This category is the most pervasive and can be found in market places, bus terminals, in buses, train stations, in trains, busy streets and other public places. From our field study of markets around Jos, there is an average of 15 hawkers in each market. Most dealers in this category operate from, or are affiliated with, chemists as commission agents for whom success depends on being a good sales person. There is therefore a material stake in employing all the sales and survival gimmicks that can be mustered. Thus, advertisement is central to their operation.

Drug hawkers operate on foot, bicycles, mopeds and vans. Whatever the means of getting around, which to a large extent is a measure of success, a school bell, loud speakers, bull horns and other forms of public address system are always in their possession. They also employ the services of clowns (*Ajasco* acrobatic dancers) for the promotion of the wares. In general, drugs are hawked with exuberance and glee reminiscent of the hawking of cold drinks at football matches. Whether dancers are employed or not, the objective is to attract attention. The following is typical of their gimmicks:

> Yes, O yes! Most of you know me very well (he was in a long distance bus), most of you don't ... I don't need introduction any way (sic) in the world. Yes, I am known all over the world. My

> name is doctor-do-good, the world man ... I am the man doctors love to hate because I cure patients they have pronounced dead! And this is why I am with you this morning to introduce to you medicine which will cure those of you the doctors have pronounced dead, those of you the hospitals have rejected (Igwe 1984).

Some will offer their seat in a crowded but or train, while others start by calling a range of afflictions--in our field study the more common ones are malaria, TB, gonorrhea, Wuro-Wuro belly (noisy stomach) and sexual impotence-- and then calling out to the afflicted to come and be cured.2 We found in one market that ampicillin capsules were sold as cure for cough, Wuro-Wuro belly, gonorrhea, headache, and colds. It was observed that when consulted this list stretches to infinity. The same merecine seller sold ampicillin for waist pains. We did not find any hawker who ran out of "the treatment" for any condition, the only limit is, apparently, the availability of customers. Further, besides this limitless indication for a particular drug, there are wild exaggerations of potency. Sometime ago TOP TABS APC (a me-too-aspirin) was advertised on radio as the "thing way pass magic," meaning that which surpasses magic! Other outlandish claims come from this merecine seller who advises: "Just take a small tumbler shot of this medicine early in the morning or in the night and I can assure you that no woman can give you gonorrhea ever in your life". Indeed, as Murphy and Baba (1981:268) have noted"

> Drug hawkers are becoming increasingly popular as healers and are frequently consulted about all sorts of complications sometimes with fatal results. Little check is made on their activities and stalls where they sell their wares are to be found in the village markets. Villagers hear about certain drugs and remedies through radio advertisements such drugs are described as panacea for all ills and are sold indiscriminately by hawkers who are more often than not illiterate.

In several areas of Nigeria, particularly in the eastern states, injections are openly administered in the market (some times with pants on!) and, occasionally, injections are poured into *ogororo* (locally brewed gin) and drunk for "instant results."

The objectives of these promotional activities, it goes without saying, is to make profits, even if packaged as benevolence. The case of doctor-do-good is recalled. In an apparent moment of exuberance, this itinerant *merecine* seller lets his audience in on his secret:

> En, good morning brothers, sisters and friends. I am here before you for no other purpose than your health. Your health is *our business* and *we must justify our pay by preaching the gospel* of your health to (Olofintila 1983:3 emphasis added).

In addition to these hawkers who operate with cavalier abandon, there are also clandestine dealers who effectively practice medicine in both urban and rural Nigeria. These non legal practitioners might be employed as cleaners and attendants in hospitals where they probably acquire their "expertise", mostly in administering injections. Unlike the other outlets who operate openly, the identity and operation of this group are carefully guarded secrets divulged only to clients (Pearce 1980; Murphy and Baba 1981). This group of clandestine medical practitioners, we note in passing, exist in varying forms in other Third World countries as well (Besha 1986; Cunningham 1970; Melrose 1982).

Detail persons. The activities of detail persons, called medical representatives in Nigeria, do not fit into any of the categories discussed above. Detail people seldom deal directly with consumers; instead, they operate through bureaucratic health care organizations such as the ministry of health, teaching and other hospitals, and clinics. But unlike others, detail persons deal in large quantities through contracts awarded through bids by these different organizations. In the process of these awards, pressure and influence are brought to bear. While technocrats are apt to point to rationality in these awards, it is, however, known that some gratification in the form of business lunches, clocks, pens, wallets, diaries, etc. are part of the game. The detail persons interviewed deny that money (bribes) is used. But they affirm that contract awards depend on a company's reputation and public image. It does appear, however, that these behind-the-scene maneuvers and knowledge of the personalities involved are as important as "rationality." In one case, the Kano state governor travelled in 1983 to a foreign country to negotiate drug deals (Alhassan 1984:1).

In spite of the claim of rationality of the bidding system, public purchases of drugs often result in the supply (sometimes over supply) of expired and non-essential items and over invoicing (Alhassan 1984; Yudkin 1980; Glucksberg and Jack 1982). A typical case of this over supply was the situation in which the University of Nigeria Teaching Hospital Enugu found itself with four years of stock of Resochin (a brand of chloroquine antimalarial) (Ojukwu 1984:1).

The scenario presented by the operations of the Nigerian drug industry is the dialectics between private profit accumulation and the inherent public hazards of the process. The Nigerian situation also raises questions about the pervasive diffusion of innovation--itself a brainchild of the modernization school--and the control of modern organizations (in this case drug companies) within the political economy of dependent capitalism.

DRUG REGULATORY MECHANISMS IN NIGERIA

The history of drug regulation and that of private medical practice in general dates back to the colonial period. During this period, patients', rather than physicians', professional judgement allegedly dictated treatment by private practitioners. Patients, for instance, demanded and received injection for a fee (Ityavyar 1986; Schram 1971; Pearce 1980). As part of its parents patriae role of protecting the consuming public, the colonial state began to regulate and control private practice. In 1941 the colonial government instituted a commission to investigate private practice (mostly by doctors in government employment) and the epidemic of injections. This committee found that treatment was dictated more by economic than professional considerations. These economic interests were particularly enhanced by injection tours which frequently had disastrous consequences. The committee found that all 35 of those injected during one such tour died (Philipson cited in Ityavyar 1986; Schram 1971:239, 254). To check this blatant abuse, the committee recommended the restriction of injections to hospitals and dispensaries.

Thereafter, regulation and control of medical practice (including drugs) became an integral part of crime control and other functions of the state. Subsequently, the necessary laws were enacted. The most comprehensive statement of Nigeria's drug law is CAP 152 of 1958. Briefly, this law states inter alia:

1. No person shall mix, compound, prepare or dispense any drugs or poison unless he is a registered and licensed dispenser or a chemist or druggist. Such license must be validated annually and displayed conspicuously on business premises.

2. Where the dispensing chemist or druggist have assistants, business must be conducted under his continuous personal supervision.

3. All poison must be dispensed only on prescription by medical practitioners, dentists, or veterinary surgeons; such prescription must be in writing. The druggist must keep records of all disposals of poisons specifying name, data, quantity and purpose stated by purchaser.

4. Patent and proprietary medicines must be sold only by a chemist, druggist or holder of patent licenses.

5. Drug advertisements can only be directed at medical, dental and veterinary practitioners and/or the governing body of hospitals, asylums and infirmaries.

6. Violation of any of the above stipulations is punishable with a fine of one hundred pounds or 2 years imprisonment.

Certainly, this is adequate legislation to safeguard against drug abuse and many of the promotional activities discussed above. But it takes more than legislative provisions to achieve the desired behaviour. To be sure, there is often a hiatus between legislation and enforcement. However, to ensure some enforcement the state has the following regulatory agencies: the Inspectorate unit, the following regulatory agencies: the Inspectorate unit, the Food and Drug Administration (FDA), and the police.

The Inspectorate unit. This unit insures that chemists and pharmacies adhere to the legal provisions as stated in their licenses. Officials of this unit complain of being handicapped by lack of funds and transportation, which they blame for violations of the legal provisions.

To inject some vigour into this unit, some states have set up special task forces to police druggists and private medical care. Plateau State provides an illustration. Here, the special task force on drug control was commissioned in 1985. This task force, headed by a military officer, comprises 12 members drawn from the police, ministry of information, the medical and pharmaceutical professions. The task force is empowered to search premises of any druggist, seize "contraband" items and hand over suspects to the police. Such confiscated items are turned over to the government for distribution to public hospitals. The Plateau State task force has carried out a number of such raids.

The Food and Drug Administration. What is now the directorate of Food and Drug Administration started as Government Chemist. The FDA was established in 1974 through Food and Drug decree no. 35 which made it obligatory for all food, drugs and cosmetics imported, produced and/or meant for sale and consumption in Nigeria to be inspected. According to this decree the purpose of the inspection is to ascertain character, value, potency and purity of the ingredients of such food and drugs. The FDA also ensures that food and drugs are properly labelled and are fit for human consumption.

The FDA is an agency of the Federal Ministry of Health and has branches in each of the 19 states. Like the Inspectorate unit of the State ministry of health, the FDA too is handicapped by lack of technical staff. In the Plateau State office for example, there are only three technical officers and the office has no vehicle.

The police. The police is a law enforcement agency and its functions include drug control. In this regard, the role of the police is similar to the Inspectorate unit, ensuring that drug dealers operate within lawful limits.

drug distribution effectively. Like the other regulatory agencies, it also uses problems of funding and shortage of personnel as convenient excuses for its ineffectiveness. And yet, the police has enough personnel and equipment to mount road blocks and hound motorists for "vehicle particulars", such as evidence of license fees and of insurance. Similarly, it is our contention that the Ministry of Health does not lack the staff to carry out sanitary inspections nor does the state lack the personnel to carry out tax drives. Tax drives, for instance, normally begin at dawn and are occasions to inflict physical and mental torture on victims. As Bonat and Ayu (1986:7) have observed, other methods include "tying up the poor defaulters with ropes; merciless beating ... the seizing or auctioning of household furniture like beds and domestic animals such as goats and chickens, stored food and whatever other valuable items that the peasant may have." The colonial nature of "sanitary inspection," described by Onoge (1975:227) as an effective "siege", has remained. Further, under the current War Against Indiscipline one could be fined up to N1000 (now about US$300) for not keeping domestic surroundings clean.

This situation truly reflects the nature of peripheral capitalism (Thomas 1984; Ngugi 1982; Horn 1985; Usman 1982) and the state which emerges from this formation. Clearly, the state is overzealous in generating revenue for itself (tax clearance certificate was once demanded before hospital treatment and pupil enrollment in former Western and Lagos states respectively), and capital for private businesses such as insurance companies. But the same state becomes lackadaisical in protecting the people from drugging and other forms of comerciogenic crimes.

DRUG REGULATION: POLITICAL ECONOMY DETERMINANTS OF INEFFECTIVENESS

In the foregoing section, we saw the ineffectiveness of the drug regulatory and enforcement agencies in Nigeria. We shall argue that rather than the lack of funds and other resources, the real reasons for this ineffectiveness are political and structural, linked to the problems of controlling modern organization (in this case drug companies) under peripheral capitalism.

The drugging of the Nigerian people is linked to modernization, the chosen path of Nigeria's national development, and to the technologies associated with this choice. The choice of modernization, clearly enunciated in government policy documents (see for instance NDP 1974, 1981 and Nnoli 1981), entails fostering and sustaining links with developed nations that are held up as models to be emulated. These links are thought to avail the Third World of experts and technology (including drugs), all necessary preconditions to becoming developed. Based on the inventory of preconditions, modernization promises a new dawn (Wallerstein 1979). It is precisely the lure of a Euro-american type of development, without taking into account the different historical circumstances, that fosters white elephant projects and assembly technologies which are so common in Nigeria's industrialization (Abba et al. 1985; Onimode 1983). But transferred technology has not led to true development; it has ironically structured and stunted development of the recipient country tying it more closely to the economy of the donor.

In the health care arena, modernization as we have detailed elsewhere (Alubo 1986b), takes the form of hospital construction, training of doctors and other staff, and importation of drugs and equipment for curative medical care (Ityavyar 1986; Erinosho 1982; NDP 1974, 1981). The Federal Government measures "achievement" in health care by growth of Western medical facilities and human resources (NDP 1981:293 and 279).

It is within this wider paradigm of modernization that drugs and other modern technologies are imported to Nigeria. The relevance of these drugs to local morbidity and mortality problems are overlooked both by the developed countries which sell, and occasionally donate them as "aid" and by Nigeria and other underdeveloped countries to whom such technology is transferred (Lall 1977; Piachaud 1980; Lancet 1980; Hardiman and Midgley 1982). Derek Gill and Andrew Twaddle (1977:383; see also Bader 1977) put the contradictions between the people's health needs on the one hand, and profit motive and images of development on the other thus:

> There is an ideological commitment which leads the developed [countries] to believe the

> export of technology to be useful. On the other side is a desire on the part of the developing countries to emulate the developed. They want the symbolic values which high technology carries, the image of development. Irrelevance to infectious disease problems and environmental hazards are overlooked on both sides.

It may thus be seen that modernization of health services and the transfer of technology it entails are part of the wider orientation to national development. But the drugs and equipment necessary for Western medical practice are not produced in Nigeria, but in developed countries whose social and epidemiological experiences differ from those of the Third World. Indeed, as Mike Muller (1982:65) has shown, only a minuscule "3 percent of the funding for biological research through the world is directed to diseases that afflict its poor nations." Herein lies a major reason for the inappropriateness of drugs imported into the Third World.

Fundamentally, therefore, MNDCs in the Third World are spurred by the profit motive and not the health problems of the people, as our opening epigram illustrates. Convincing Third World countries to continue buying drugs, even if these provide no solution to the real health problems, is predicated on erroneous belief that health care is curative medicine. Through this conception, which neglects the real health problems of hunger and squalour, medical care has been foisted on the people as health care. Maintenance of the drug market is also ensured through economic stakes in the drug industry. Many Nigerians, particularly since the indegenization decree which stipulates a 40 to 60 equity participation for major businesses, have invested money in drug companies. Furthermore, people at the lower level of the drug industry (like patent dealers, pharmacy shop owners, medical representatives) equally have a material stake in drugging. Medical representatives for example are in the habit of setting up their own drug business, the necessary contacts having been made while detailing. Such businesses become the launch pads for drug distributorship (directly from MNDCs) and supplies to government. Some detail persons are simultaneously engaged in detailing and running their own pharmacy shops. In this way, the drug industry reproduces itself and the neo-colonial political economy of which it is a part.

A major target of MNDCs is the state. This is because under dependent capitalism the state is easily influenced into bulk purchase contracts often times of unnecessary or even expired items (Yudkin 1980; Glucksberg and Jack 1982; Ojukwu 1984). The role of the state as both intermediary and outlet is facilitated by the close relations between the public and the private sector in which drugs and other equipments are funnelled from the former. As an example, it can be cited the case of UNICEF drugs which were sent to Bauchi State in 1986 and were found later in public markets. Indeed, as we have argued elsewhere (Alubo 1986a:475), the medical profession uses the state to import drugs which invariably helps to sustain private medical care business. The medical profession is linked to drug companies in other ways through funding of journals, conferences, and medical education and research. It is in this light that Upjohn in 1983 instituted a prize of N1000 (then US$1400) for the best medical school graduate. According to Upjohn's Vice-president the prize "symbolize(s) the contributions made by Upjohn employees to health and health education in Nigeria" (Nwakanma 1983:1). In the final analysis, therefore, whether it is tagged public or private--itself a spurious demarcation (O'Connor 1973)--drug imports serve the same purpose of furthering capital accumulation and profits.

Most medical care in Nigeria is concentrated in the cities, specifically in state capitals (NDP 1975:260), but structural factors determining access are not limited to the geographical location of facilities. In general, access to medical services in Nigeria is determined by one's economic ability and status in the public service. The post colonial state operates a superfluous policy in which access to medical care is both a fringe benefit to its employees and a constitutional right. Furthermore, these state employees are charged with ensuring that no one (including the unemployed, peasants and the private sector) is neglected. The fact that has consistently emerged, however, is that this general legal provision is pushed aside for status, power (including economic power) and privileges which determine whether and what type of medical care one gets in contemporary Nigeria (Alubo 1986c; Stock 1985; Onoge 1975).

The majority of the people who do not have medical care as a job related benefit nor the ability to pay are discriminated against. Hence, the druggist becomes a convenient alternative for this neglected majority. As a result of this sustained deprivation, this neglected majority has become distrustful of the elite even when the latter is ostensibly acting in the former's "interest." This point is illustrated by the passage below in which a commoner refused to be discouraged from purchasing "fine fine mericine" from a hawker:

> Here they come again. Those who will not let one be. Educated man, just leave us alone to buy what we want. When you are sick you do not delay in going to America for medical attention (Olonfitila 1983:3).

The itinerant druggist provides the only access to Western "medical care" for a majority of Nigerians. In another example of this drugging, it was found that within a year a drug store sold about 10 million tablets of Dapsone B.P. to outlets other than leprosy clinics (Oculi 1981:157).

Ironically, another important factor which influences drugging is shortage of medicines in the public hospitals. A study has shown that 60 to 70% of all prescriptions in public hospitals in Benue State are unavailable (Alubo 1986c; Igun 1979). In our circumstances where only a few appreciate the value of prescription, the general predisposition is to go to the druggist where, unlike public hospitals, there are neither "queues and insults," and drugs are available. There is then a compelling logic in avoiding the hospitals, after all, the druggist could always "counter-prescribe." So why waste time going to the hospitals for just a prescription which is available free elsewhere?

CONCLUSIONS

In Nigeria's health sector there is little to show for the pursuit of modernization. While the government has continued to measure in medical terms (number of hospital beds and medical staff) health achievements, the real health indices such as caloric intake, days of disability, etc. are seldom mentioned. Improvements in other indices like life expectancy at birth (40 years in 1965 and 47 in 1983 for males and 43 and 50 for females in the same years) and infant mortality (152 in 1965 and 113 in 1983) do not reflect modernization nor correspond to the resources invested.

Even as we lack the figures on drug related deaths and illnesses, it is plausible to conclude that given the factors which encourage self-medication and other forms of drugging, many Nigerians have been actual, even if unrecorded, victims of drugging. In addition to these hazards created by the technology transferred, the modernization policies followed in Nigeria divert resources from the real health needs--nutrition, water, sanitation. In this regard the Chilean economist Jorge de Ahumeda has argued that every dollar spent in Latin America on physicians and hospitals cost a hundred lives. This thesis is equally applicable to Nigeria. The point here is that were the money better spent, one hundred lives could be saved (Barnett and Muller 1974:165; Muller 1982:19).

Some general implications flow from the modernization path to Nigeria's development generally and health development in particular. As this paper has illustrated, the research and development, and, consequently, the production of drugs, are not geared towards Third World problems. But as we have seen drugs are an essential component of health care delivery in Nigeria. Nigeria's health policies effectively accept what MNDCs decide to produce and market in the name of drugs. Additionally, Nigeria has no control over the price/s of drugs. To achieve a better control over drug prices the current tender (bidding) system should be abolished and the adoption of a national formulary should be taken seriously. As experiences from other Third World countries have shown (Melrose 1981) the introduction of a national formulary eliminates the large expenditures for advertisements and leads to lower costs. One can also suggest that its adoption may also reduce the abuse and misuse of drugs.

NOTES

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1. Chemist is the Nigeria parlance for drug stores. The term is used here to refer only to Patent Medicine Stores.

2. Graphic description of the business practices of itinerant merecine sellers may be found in the popular press. See for instance Olofintila 1983, Igwe 1984 and the cover study in the African Guardian, April 3, pp. 12-19, 1986.

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DRUGS AND UNDERDEVELOPMENT:
A CASE STUDY OF KANO STATE, NIGERIA

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> In world-wide terms, the African market for the powerful drug manufacturing giants is small-about four per cent in all. Despite this, with other markets beginning to wane ... the African market has become a prime target for what is euphemistically termed "potential" (New African 1983 [December]:63).

Pharmaceuticals are among the most ubiquitous and widely-used products of modern industry. Although the Third World market accounts for a comparatively small proportion of global pharmaceutical sales, the value of this market to the transnational drug manufacturers is immense. Not only does the concentration of three-quarters of the world's population in the Third World indicate much potential for future market growth, but the inadequacy of legal controls over pharmaceutical manufacturers and distributors in most of these countries provides opportunities for companies to experiment with new products, to dump drugs banned elsewhere as dangerous or of inferior quality, and to make excessive profits at the expense of Third World consumers.

Pharmaceutical products, like many modern innovations introduced into the Third World, have been a double-edged sword. While pharmaceuticals have much potential for alleviating suffering and saving lives, they have been instrumental in the emergence of significant new social and medical problems. Their impact, whether positive or harmful, is a consequence of the ways in which the products are used, and ultimately the ways in which they are promoted and distributed to consumers.

In recent years, there has been considerable research on issues concerned with the promotion, distribution and inappropriate use of drugs in the Third World. The most comprehensive surveys are to be found in books by Melrose, Bitter Pills: Medicines and the Third World (Melrose 1982) and by Silverman, Prescriptions for Death: The Drugging of the Third World (Silverman et al. 1982). These studies examine the multinational pharmaceutical industry's tactics in promoting their products in the Third World, and show how exaggerated claims about the uses of the product and incomplete disclosure of pertinent cautionary information about inappropriate uses and side-effects jeopardize the health of consumers. The clearest examples of the pharmaceutical industry's culpability are to be found in the dumping in poorly-regulated Third World countries of products which have been banned elsewhere (Madeley and Achola 1980).

THE IMPACT OF PHARMACEUTICALS IN THE THIRD WORLD: DEVELOPMENT OR UNDERDEVELOPMENT?

The study of social and economic change in the Third World is centered around two broadly-defined paradigms. The developmentalist paradigm, exemplified by modernization theory, was predominant during the 1960s and still persists, particularly in the form of various bottom-up approaches to development. Modernization theory examined the assumed transformation of societies from "traditional" to "modern", which Rostow (1960) had postulated as occurring in five stages. The literature of modernization displays a common optimism about the transformation of the Third World.

A sub-set of the modernization literature has studied the diffusion of specific modern innovations such as new crops and birth control technology. Innovation diffusion studies sought to relate patterns of spread, socially and spatially, to broader dimensions of development and the socio-economic attributes of the adopting populations. However, there was little effort to critically examine the full range of impacts of innovations which were assumed to be inherently beneficial and progressive.

Since the late 1960s, the underdevelopment paradigm has been prevalent, especially in academic research. Whereas the former paradigm saw Western influences, including the impact of Western technological innovations, as elements of progress, the latter saw them as contributing to the disintegration of Third World societies and economies.

The initial thrust of research within the underdevelopment paradigm came in the form of dependency theory. According to Andre Gunder Frank (1969) and other dependency theorists, the penetration of metropolitan economic linkages, cultural influences and technology in the Third World fostered underdevelopment rather than progress. More recently, Marxist theories of underdevelopment have become increasingly prominent in the study of socio-economic change in the Third World periphery. The articulation of modes of production, inspired by Rey's study of colonialism in central Africa (Rey 1971) has been especially emphasized in the Marxist underdevelopment literature. The capitalist mode of production and specific innovations associated with capitalism are seen as being imposed gradually and unevenly at the expense of indigenous modes of production.

Whereas social scientists situated in the development paradigm have focussed on patterns of diffusion and the individual characteristics of adopters, researchers informed by underdevelopment theories asked questions about the ideological, political and economic origins of innovations and their impacts upon society (Blaikie 1978). The importance of structural factors facilitating the diffusion process, rather than adopter characteristics, was also emphasized (Brown

1981). Such questions concerning the origins and societal impacts of modern technologies introduced into the Third World are important because of their many influences on ways of life, the quality of life, and sometimes - in the case of pharmaceuticals, for example - the probability of life itself.

There are few innovations which have had, are having, and potentially have a global impact comparable to that of modern pharmaceutical products. Pharmaceuticals are the cornerstone upon which modern biomedicine has been built. Modern drugs, especially antibiotics, have been instrumental in controlling a variety of infectious diseases and thereby saving lives. The accelerated epidemiological transition from higher to lower rates of mortality in the majority of Third World countries is attributable in very large measure to the introduction of modern medicine (Omran 1977). The most dramatic gains in saving lives have been among infants and young children, who have benefitted not only from curative medicine but also from preventative measures such as mass immunization. The broad masses of Third World poor, especially in underdeveloped peripheral areas, have not received the full benefits of immunization technology, despite its inexpensiveness and effectiveness. The Expanded Immunization Program (EPI), organized under the auspices of UNICEF, is now organizing mass immunization programs to provide complete coverage for young children against the major preventable causes of child mortality. While the short term result is likely to be accelerated population growth, a reduction in infant and child mortality is a crucial precondition for the acceptance of sustained, voluntary fertility control (Demerath 1976).

Detracting from these beneficial effects are the social, economic and medical costs of health-threatening drugs used inappropriately. Medical "side effects", sometimes fatal, are associated with the use of some drugs; the cure can be worse than the sickness. Illness may also be needlessly and dangerously prolonged when therapy involves the use of medicines which are ineffective, quite possibly because of product misrepresentation. Pharmaceutical products used indiscriminately and without regard for proper dosages and treatment regimes may lose their efficacy for legitimate medical purposes (Silverman and Lydecker 1981). Some medicines are addictive and bring severe social, economic and medical consequences for addicts and their families.

There is an unnecessarily high risk that the drugs used by Third World consumers will actually harm their health. The primary reason relates to the commonplace marketing practices of the multinational drug industry - drug dumping, exaggerated claims about indicated uses and minimal cautionary notes in advertisements and company literature, and the use of incentives for physicians and officials (Melrose 1982; Silverman et al. 1982; Yudkin 1984). The paucity of research and development expenditure pertaining to the diseases of underdeveloped countries is another way in which the policies of the drug multinationals adversely affects the health of Third World people (Doyal 1984). Only one percent of approximately $5,000 million spent by the industry on research and development is spent on Third World diseases (Taylor 1982).

While many of the issues surrounding the political economy of drug promotion at a macro-scale are now relatively well understood, our knowledge about the patterns of distribution and utilization of modern pharmaceuticals in particular Third World settings remains very sketchy. What are the various chains of distribution, starting with the multinational pharmaceutical companies and ending with consumers? To what extent are there variations - spatial, social and economic - in the availability and utilization of modern pharmaceuticals? How are patterns of availability affected by such factors as drug control policies of the state, the nature of the conventional health care system, advertising, and cultural perceptions about the nature of illness and its appropriate treatment?

The predominance of informal utilization (i.e., self-medication) among Third World consumers is one reason for our relative ignorance about these issues. We also know little about the structure and functioning of the informal, unregistered and unregulated distribution networks for drugs, including various types of quacks and drug peddlers, which are so important in Third World countries. The work of van der Geest provides useful insights into the workings of the unregulated informal health care system as distributors of drugs in Cameroon (van der Geest 1982a; 1982b, 1985).

While the basic structure and significance of informal drug distribution systems in other Third World countries is likely to be comparable to that of Cameroon, research on these issues is needed elsewhere in the Third World. Policies to safeguard public health by improved regulation of drug distribution must be based on a firm foundation of knowledge about actual patterns and processes locally.

The current alarm over the spread of the deadly and still incurable disease AIDS provides a compelling reason to learn much more about all systems of drug distribution in the Third World. The reuse of contaminated hypodermic needles has been implicated as a likely vehicle for the spread of AIDS and ARC (AIDS-related complex) in the so-called AIDS belt of Central Africa, where AIDS may afflict 5% of the population in certain areas (Riley 1986). If the connection between AIDS and contaminated needles is real, then upgrading the quality of conventional health care programs in the Third World and effectively regulating the activities of injection salesmen and other informal-sector sources of medicines is absolutely essential.

What follows is a case study of the growing utilization of pharmaceutical products in Kano State, Nigeria. It focusses on the patterns of distribution of pharmaceuticals, seeks explanations for the growth in utilization, and discusses some of the economic, social and medical impacts. This is a preliminary study, reflecting the virtual absence of official data, the covert nature of most illegal drug distribution, and the reluctance of consumers to be candid about their acquisition and utilization of drugs obtained from illegal sources. Although the data are sketchy, they clearly show that pharmaceutical consumption is rapidly increasing in both urban and rural settings, that the state has had little success either in ensuring an adequate supply of drugs for its health care facilities or in controlling the proliferation of illegal drug sales, and that modern pharmaceuticals have truly been a double-edged sword in their impact in Kano State.

THE NIGERIAN PHARMACEUTICAL EXPLOSION

With a population estimated to be over 100 million, and with a petroleum-dominated economy which provided an average annual rate of growth in federal government revenues of 26% between 1970 and 1980 (Watts 1984:403), Nigeria has clearly been the most lucrative and fastest-growing market in Africa for the transnational pharmaceutical industry. Pharmaceutical imports into Nigeria amounted to an average of $5,760,000 per year during the 1960s (Table 1). Between 1980 and 1984, the mean value of pharmaceutical imports into Nigeria had increased to $346,558,000 per year, including a high of $621,382,000 in 1981. Thus, imports during the 1980s have been, on average, 60 times as great as those during the 1960s.

Nigerian imports of pharmaceutical products have been high in comparison to other Third World countries. Between 1980 and 1984 Nigeria was the largest importer of pharmaceuticals in the Third World, and ninth largest in the world. During this period, for example, Nigerian drug imports were more than double those of Brazil, four times as great as India's and fifteen times as great as those of Bangladesh (United Nations 1985). Other large Third World countries such as Brazil, India and Egypt have much better-developed indigenous pharmaceutical industries, and so are less dependent on imports.

Nigeria's forty-fold increase in drug imports in one decade is primarily due to a significant diffusion of the utilization of these products in Nigeria. Not only are more Nigerians using pharmaceuticals, but they also are using them more frequently and are tending to consume more specialized and expensive products. Actual levels and patterns of pharmaceutical utilization vary within Nigeria, especially between urban and rural areas, between social classes, and between regions which are more and less affected by modern Western influences. Much of the expansion is attributable to the growth of the health care system since 1970, but it is even more a consequence of consumers' increased purchases of drugs from retail outlets, but formal and informal. However, this growth cannot be explained without reference to the marketing strategies of the pharmaceutical industry, targeted to influence government officials, physicians, commercial agents, and consumers.

TABLE 1

NIGERIAN IMPORTS OF PHARMACEUTICAL PRODUCTS
1960 - 1984
($1,000 U.S.A.)

1960	4,635	1970	35,720	1980	312,981*
1961	5,131	1971	57,780	1981	621,382*
1962	4,636	1972	48,465	1982	240,519*
1963	5,081	1973	59,906	1983	450,709*
1964	5,102	1974	73,759	1984	107,199*
1965	5,775	1975	139,560		
1966	5,840	1977	203,965		
1968	7,130	1978	253,577		
1969	8,766	1979	220,985		
Average Annual Imports					
	5,760		126,473		346,558

* = Estimated Figures

Source: Yearbook of International Trade Statistics New York: United Nations (volumes for 1962-1984)

PHARMACEUTICAL DISTRIBUTION IN KANO STATE, NIGERIA

Pharmaceutical products reach Kano State consumers through three types of channels, namely the health care system, licensed retailers of medicinal products, and various unlicensed and often illegal distributors of pharmaceuticals.

Kano is the most populous of the 19 states in Nigeria, with a 1981 total of 9,467,000 people (Kano State 1981a). Over 90% of the population is of Hausa and Fulani ethnicity, and virtually all are Muslim. There is one major city, Kano, with approximately one million inhabitants; the remainder of the population lives in small towns of under 50,000 people and in rural areas. Kano State, especially the rural areas, was extremely neglected during colonial times. Disparities in development, both between urban and rural Kano State, and between Kano and the southern Nigerian states, are still considerable.

The Health Care System

Most of Kano State's Western health care system is government-administered. At the bottom of the hierarchy of facilities are dispensaries, the great majority of which are operated by local government authorities and staffed by minimally-trained primary health care workers. Inpatient care and the more specialized health care services are provided at general hospitals, constructed, staffed, and administered by the state government. There are thirteen such general hospitals in Kano State (eleven state-owned and two private), plus six specialized hospitals (e.g. infectious diseases, orthopedic, psychiatric, and military) (Kano State 1981b). The middle level of the health care system remains poorly developed; it consists of nine Rural Health Centers and 61 Health Clinics constructed under the Nigerian government's Basic Health Services initiative. They are staffed by fully-trained primary health care workers and nurses who are able to deal with a much broader spectrum of medical problems than dispensary attendants.

Although Kano State remains grossly underserved in terms of health care with a total of only 204 doctors in 1981 (one per 47,000), there has been considerable growth in recent years in the size and complexity of the system. With health services being provided in increasingly remote areas, and with a wider range of services provided, the demand for pharmaceuticals for this health care system continues to grow. The expansion of child vaccination programs in rural areas using mobile teams of health workers represents but one aspect of this growth.

The rapid growth of the system in recent years, the severe decline in petroleum revenues since 1980 and the lack of political will and foresight have all contributed to the declining quality of public sector health care (Stock 1985). Chronic shortages of trained staff, essential equipment and all drugs are the most visible manifestations of the crisis.

In addition to the public health care system, there is a small but rapidly growing private-sector system. As of 1981, thirty of the 204 doctors had private practices in the city of Kano. The number of private-sector physicians in Kano approached 100 as of 1985.

Licensed Retail Outlets

Pharmaceuticals are sold at licensed retail outlets of two types, namely pharmacies and patent medicine stores. The former are allowed to sell a full range of drugs, but must employ a fully-trained pharmacist, while the latter are restricted to selling a small number of commonly-used patent (non-prescription, over the counter) medicines.

Patent medicine stores were first licensed in 1981 in Kano State. Licensing was introduced in response to the growth of drug abuse, and the increasingly visible sale of all kinds of drugs. Potentially harmful products were being sold openly by petty traders and quack practitioners. Licensing was also seen as a device to encourage entrepreneurs to open medicine shops outside the city of Kano. Moreover, it was reasoned, these patent medicine stores would relieve some of the pressure on the official health care system by providing an alternate source of medicine for rural people. In reality, it represented a tacit acknowledgement of the failure of the government health care system to fill public demand for care.

The fee for obtaining a license, Naira 150 (approximately $225US) was excessive for most of the previously unregulated drug sellers in Kano State. The fact that license holders were to have a minimum of a primary school education also disqualified the majority of the former drug retailers, since most adults have no Western education. The educational restriction and excessive cost of a license ensured the perpetuation of an illegal trade in pharmaceutical products. The high cost of licensing also ensured that patent medicine retailers would not be content to sell only common patent medicines. Most illegally sell a variety of more potent and dangerous, but also more profitable, drugs. Many also illegally administer injections. The licensing law has failed to restrict drug sales to license-holders, and has also failed to stop illegal drug sales by licensed retailers.

Table 2 shows the increase in patent medicine stores in Kano State, especially since 1980. Whereas most of the early growth in patent medicine stores was in the city of Kano, more recent growth has been in rural parts of the state. The increasing density of rural patent medicine stores is related to the licensing law which reserved licenses for new urban medicine stores for retiring employees of the Kano State Ministry of Health. While this may have diverted some retailers into rural areas, it has also provided an incentive for professional health workers to leave the chronically understaffed public service to set up retail businesses.

Despite the increase in rural patent medicine stores, approximately two-thirds of licensed pharmaceutical outlets are still found in Metropolitan Kano. Most of the "rural" shops are being established in larger towns such as Hadejia, Dambatta and Birnin Kudu, rather than in truly rural areas. The concentration in the city of Kano and to a lesser extent in the larger towns reflects the distribution of demand and purchasing power. Urban consumers generally are aware of a greater range of pharmaceutical products, and are more likely to be able to afford costly drugs.

Patent medicine stores are to be found in all parts of Metropolitan Kano. However, the greatest concentration is in the primarily migrant quarters such as Sabon Gari (one-third of the total of 334 shops) and Gwagwarwa-Brigade (one-fifth of the total). There are lower concentrations in the indigenous Hausa and Fulani neighborhoods, reflecting the much shorter history in northern than in southern

TABLE 2

PATENT MEDICINE STORES IN KANO STATE 1975-1982

	Kano State	Kano Municipal	Rest of State
1975 (estimated)	55	50	5
1978 (estimated)	170	150	20
1981 (registrations)	439	334	105
1982 (registrations to July)	410 (+116*)	266 (+72*)	144 (+42*)

Source: Unpublished data, Ministry of Health, Kano State.

*Presumed to exist
Registered in 1981 but unregistered as of July, 1982.

Nigeria of mass education and reliance on Western medicine. Licensed pharmacies, which serve a much larger clientele and sell a full range of pharmaceuticals, are concentrated in the central business district and along major transportation arteries.

Unlicensed and Illegal Distributors

The 1981 licensing regulations for the sale of pharmaceutical products were designed to control the growing problem of drug abuse by controlling the sources of supply of potentially harmful drugs. However, the licensing regulations were bound to fail because of the unrealistic requirements for holding a patent medicine store license. Moreover, the fact that the already established informal trade in drugs was as much in antibiotics and amphetamines as in aspirins was not recognized. The law restricting medicine stores to common patent drugs effectively eliminated the possibility for the legal sale of the more potent pharmaceuticals outside Metropolitan Kano.

Prior to 1981, there were no legal prohibitions to prevent shopkeepers and petty table traders from selling medicines. Whereas most of these traders sold only common patent medicines, others specialized in more patent, potentially dangerous drugs such as amphetamines and antibiotics. It was commonplace to find traders in markets, lorry parks and along the street, calling out "kwaya!" (pills) and "kafsur!" (capsules). Itinerant injection salesmen were another illicit source of drugs. Many larger centers had resident medicine sellers, often government health care workers who engaged in so-called "private practice". Restricting the sale of pharmaceutical products merely forced traders to be more careful in selling them. Nevertheless, a brisk under-the-table trade has continued.

Survey data for sampled localities in Hadejia Emirate, Kano State confirm that a variety of drugs were very widely available in rural areas of the State, and show that the 1981 attempt to regulate pharmaceutical sales had totally failed. At least one type of pharmaceutical product was available in each of the 75 villages (Table 3), despite the fact that only two of them had licensed patent medicine stores. Moreover, there had been significant diffusion of drug sources between 1977, when a similar survey was conducted in the same

TABLE 3

AVAILABILITY OF SELECTED DRUGS FROM COMMERCIAL SOURCES IN RURAL KANO STATE

Population of Locality	Under 1,000 (n=44)	Over 1,000 (n=31)	Total (n=75)
Percent of Surveyed Villages Where Medicines are Sold[1]			
Mentholated ointments	100.0	100.0	100.0
Aspirin	95.5	100.0	96.7
Anti-malarials	20.0	50.0	69.4
Penicillin ointments	81.8	93.3	87.7
Capsules[2]	72.5	93.3	81.4

Source: Sample survey of primary school headmasters in the Hadejia area, 1982.

Note

1. Percentages have been calculated to exclude missing data.

2. Hausa laymen usually apply the inspecific term kafsur to any drug sold in capsule form. These are primarily antibiotics and stimulants (amphetamines).

region and 1982. As of 1982, aspirins were sold in 97% of localities, compared to 79% in 1977 and capsules were available in 81% of the sampled villages compared to 7% in 1977.

Between 1982 and 1985, the enforcement of patent medicine store regulations was relaxed, although the law remained unaltered. The result has been a gradual reappearance on the street and in small shops of illegal pharmaceuticals. This does not imply a significant change in the availability of illegally marketed drugs, but rather in the visibility of the prohibited trade. Nevertheless, most of the trade in dangerous drugs remains literally hidden.

Explaining the Growth in Pharmaceutical Use

The explosive increase in pharmaceutical imports into Nigeria between 1969 and 1981 encompassed significant growth in each of the three distribution networks. Although sectoral data are not available, the greatest proportional growth has seemingly occurred in the commercial sectors, including both illegal and licensed distributors. The growth in imports and utilization of the more expensive and potent drugs such as antibiotics and stimulants has almost certainly exceeded that of patent medicines.

The growth of the health care system, made possible by increased petroleum revenues during the 1970s, represents a primary reason for the increase in pharmaceutical imports. All levels of government significantly increased levels of funding to the health care sector. New facilities were established at a rapid rate, and allocations for drug purchases were substantially increased. Not only were there more patients to be treated, but physicians and patients have lobbied for increased drug purchases to improve the quality of health care. Much of the shortage of pharmaceuticals has been attributable to the theft of drugs from the public health care sector for sale to traders or for the "private practices" of health workers. These linkages between the formal and informal health care sectors has been examined by van der Geest in a study from Cameroon (van der Geest 1985).

There have been three periods of substantial increase in drug imports. The first was immediately after the 1967-70 civil war, the second following the 1975 coup which removed General Yakubu Gowan's government, and the third following the election of Shehu Shagari's civilian regime in 1979. In the last two cases, new administrations sought to increase their popularity by responding to public demands for better health care. The apparent benefits to the public of increased drug imports have always been, at best, temporary. The benefits to the pharmaceutical industry, as well as many well-placed politicians, civil servants, and health care workers have been much more tangible.

Despite the increased pharmaceutical purchases for the health care system, complaints about chronic drug shortages have grown steadily in both rural and urban areas, and the use of alternate sources of biomedicine has accelerated rapidly. When the Shagari government was overthrown in 1983 in a military coup led by Major-General Muhammed Buhari, one of Buhari's justifications was that "our hospitals have become mere consulting clinics, without drugs to treat people". When Buhari's government was overthrown by Major-General Ibrahim Babangida in 1985, the same line was repeated in Babangida's acceptance speech: "Our hospitals have become mere consulting clinics."

The growth of the health care system has had a significant demonstration effect, particularly in states like Kano State which previously had few health care facilities. Increasing numbers of people are becoming accustomed to Western-type medicine and are using it along with and often in preference to traditional remedies. Injections remain the most valued form of Western medicine. This reflects the success of past mass campaigns against lethal diseases such as smallpox and sleeping sickness, and the perceived value of injections as both a prevention and cure for venereal and other diseases. The Hausa believe the injection is particularly effective because the needle penetrates the body to the source of the affliction (Last n.d.). Thus, injections are often specifically requested by patients at health care facilities. Commercial drug dealers cater to this demand by selling injections to anyone willing to pay the price.

Patients wanting to obtain biomedicine may be forced to patronize the informal, licensed or unlicensed, health care system. Many remote parts of Kano State lack accessible health care facilities. Elsewhere, patients seeking treatment at a health care facility are very likely to be told that drugs are not available and must be purchased. Many simply assumed that going to a health center would be a waste of time and go straight to the local medicine store or drug hawker.

The diffusion of drug utilization has been aided by the migration process, both of southern Nigerians to the North and vice versa. People in the South have had a longer and more intensive exposure to modern pharmaceuticals and commonly make extensive use of commercial drug outlets. Southerners have played a key role in the spread of patent medicine stores in Kano State; of 431 registered owners in 1981, 64.7% were from states other than Kano, including 39.0% from Imo State (Kano State 1982).

Rural-urban migration, particularly the seasonal labor migration of northerners to large cities such as Lagos, has been an important stimulus for increased drug use and abuse. Migrants to the city have the opportunity to experiment with a range of drugs, obtained commercially, for the treatment of illness and for non-medical purposes. Stimulants such as amphetamines (roka or "rockets" in Hausa) are often used by these labor migrants to increase their capacity for heavy work, to lessen hunger, and to stay awake for long hours. They commonly develop an addiction to these substances, and so must find a way of sustaining their drug habit once they return to the village (Salamone 1973).

The non-medical use of pharmaceutical products is not confined to migrant laborers. Peer pressure is an important factor in the growing non-medical use of drugs such as Valium by young people. However, the use of drugs as stimulants is indirectly aided by the Muslim prohibition on alcohol; taking drugs is seen as a somewhat more acceptable form of indulgence among Nigerian Muslims (Salamone 1973).

Further explanation for the ready acceptance of Western drugs by the Hause may be found in their eclectic approach to the treatment of ill-health. The Hausa are open-minded about the use of new and non-traditional forms of treatment, and say that the key test is the medicine's effectiveness in bringing a cure. Moreover, there is a strong tradition of self-treatment. Increasingly, Western pharmaceuticals are being substituted for herbal remedies in self-treatment. Such self-treatment is likely to involve not only the use of common patent medicines but also antibiotics taken on a regular basis as a cure-all. In recent years, for example farar kafsur ("white capsules") have been very popular as a cure-all for everything from the prevention of venereal infection by prostitutes, to the protection of newly-weaned toddlers, to the treatment of conjunctivitis by topical application of the capsule's contents.

Certain entrepreneurial traditional healers in urban settings have responded to the growing market for modern drugs by preparing and bottling their own traditional medicines for commercial sale. The remedies of a small number of these healers are in great demand. However, the distribution of commercial herbal medicines remains uncontrolled and subject to abuse. The preparation of these bottled traditional remedies has helped to blur the distinction between indigenous and Western medicines in the minds of consumers.

While factors such as political decision-making and growing public familiarity with pharmaceuticals are significant, no factor is more important than the role of the pharmaceutical industry in promoting the sale of its own products. Patent medicines are heavily advertised using a variety of media, particularly radio, television, newspapers, billboards and loudspeaker vans. Other promotional tactics are directed at physicians and various incentives, both financial and material, are offered to encourage the purchase of particular brand-name pharmaceuticals. Extensive product promotion helps to stimulate public demand, and convinces physicians and official buying agents to purchase expensive brand-name equivalents of generic products and drugs many of which are of marginal utility in the Third World.

CONCLUSION

It is dangerous to generalize about the impact in the Third World of technological innovations such as modern pharmaceuticals. There have been both positive and negative impacts, rather than strictly positive ones as modernization theory would suggest, or inherently negative ones as dependency theory would imply. Modern pharmaceuticals have contributed significantly to the ongoing struggle to control infectious diseases in the Third World, and have the potential to contribute much more. At the same time, potent drugs pose a significant danger to health, especially when used without direction and for non-medical purposes.

The effectiveness of modern pharmaceuticals, and the risks involved in their use, are affected by many factors. Thus, it is important to establish the context in which utilization is taking place. Within the formal health care system, factors affecting the utility of pharmaceutical products include the availability of the appropriate drug for a particular need, storage conditions which may be crucial to the product retaining its potency, the stage of illness at which treatment is sought, the quality of professional diagnosis and care, and the extent to which patients follow instructions in taking medicine. There are significant differences between dispensaries and similar low-order facilities staffed by poorly-trained and over-worked workers using a few drugs, and hospitals which employ more qualified staff who dispense a wider range of medicines which are potentially dangerous when abused.

While pharmaceuticals used in the formal health care system seem to represent a mixed blessing heavily dependent on the way in which they are used, drugs sold through inadequately regulated commercial channels have had an overwhelmingly negative impact. Profit margins rather than the health of consumers motivate entrepreneurs to sell drugs. Through the widespread uncontrolled sale of antibiotics, for example, drug resistance has increased, and various products have been rendered medically ineffective. Commercial channels are the primary outlets for sub-standards, "dumped" drugs which are likely to be useless or harmful. Commercial channels, both licensed and illegal, supply addictive drugs which ultimately may have serious medical and social consequences for users and their families.

While circumstances related to the utilization of pharmaceuticals are very important, it is imperative as well to examine the broader political and economic context of the provision of drugs in Third World countries. The state plays a crucial role in regulating the volume and composition of drug imports and the internal distribution of these products (Grieve 1985). Since most of the formal health care system in Kano State is government-run, the state is also the major purchaser of pharmaceutical products. Neither the Federal Nigerian government nor the Kano State government have shown sufficient foresight nor political will to establish any degree of control over pharmaceutical imports and distribution. The attempt by Kano State in 1981 to license all drug sellers showed a recognition of the need for better control over drug distribution. However, the law was bound to fail because of its thoroughly unrealistic requirements for receiving a license, and the state government's lack of control over drug imports into Nigeria. At the federal level, there is still no legal framework for the operation of a Food and Drugs Administration Unit in the Ministry of Health, more than a decade after its establishment.

The lack of political will to bring about effective regulation can be attributed as much to the profits realized from the drug trade as to bureaucratic disorganization. Government decision-makers and customs officials, health care workers and pharmaceutical manufacturers and distributors have a common interest in the profits associated with maintaining a free flow of pharmaceuticals. Unfortunately, the most profitable drugs are frequently not those most needed for public health benefits. It is sub-standard products, often declared unfit for sale in other countries, and expensive luxury drugs which have nothing to do with basic health care needs which are most likely to be profitable. Public demand for better health care, stimulated largely by promotions and material incentives from the pharmaceutical industry, are crucial in legitimating a drug trade which clearly shows the choice of profit over health (Yudkin 1980).

The shared interests of state, professional and commercial actors must not be interpreted in a deterministic, structuralist fashion. Certain Third World countries, including Bangladesh, Sri Lanka and Mozambique, have taken strong action to control the supply of pharmaceuticals by restricting imports to a short-list of products deemed most essential (Melrose 1982; Lall and Bibile 1978; Bangladesh 1983). The bulk purchase of generic products instead of high-priced brand-name drugs has also produced substantial saving. In turn, this ensures that more of the essential pharmaceutical products can be obtained, and that the health benefits may be spread more widely. Despite the obvious health benefits of improved regulation (Blum et al. 1981), as well as the promotion of basic drug programs by the World Health Organization (WHO 1977) and other agencies, there are still few examples of countries which have successfully challenged the hegemony of the pharmaceutical industry and implemented policies which put health for many ahead of profit for a few. Nigeria is not one of them.

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UNEQUAL ACCESS TO PHARMACEUTICALS IN SOUTHERN CAMEROON: THE CONTEXT OF A PROBLEM

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If we want to understand health care problems in developing countries, we should study pharmaceuticals(1) which play such a key role in the organization and functioning of many Third World medical services. Primary health care that does not guarantee a regular supply of medicines loses its credibility. Mamdani and Walker (1985:1) remark that shortage of - curative - drugs weakens people's confidence in preventive health services and undermines the morale of primary health care workers. Nichter (1986:349) found that in South India health auxiliaries were not allowed to hand out any medicine. They felt that, as a result, both their status and people's receptivity to their medical advice were seriously reduced. In Cameroon, where I carried out research, modern medical treatment without drug prescription was out of the question. Services that ran out of drugs, also soon ran out of patients.

But what do we want to know about pharmaceuticals? What kind of research is most likely to enable us to formulate suggestions for meaningful change? Problem number one is problem identification. Are difficulties mainly economic, pharmacological, political, technical, or infrastructural? Or a matter of customs and beliefs? Or do they have to do with social relationships? The awkward answer is that probably all these possibilities need to be taken into account.

In this paper I shall demonstrate that the provision and the use of pharmaceuticals are intricately linked up with a confusing array of factors and circumstances. So-called modernization and economic development mean in practice that different groups in society enjoy extremely unequal access to medicines. Because it is virtually impossible to deal with the whole gamut of relevant contexts, I will restrict myself to considering contextual forces which seem of particular political and economic importance in the rapidly modernizing state of Cameroon. These include the survival imperative for this young state to increase political cohesion among its population, the problem of over-bureaucratization leading to 'corruption', intertwining relations between formal and informal sectors in the economy of health care, contrasts between public and private supply of medicines, the role of multi-national industries, and the influence of WHO policy guidelines.

A second, simultaneous, aim of this paper is methodological: I shall plead for more 'contextuality' in health care research, in particular in studies on the distribution and use of pharmaceuticals. Unfortunately the removal of people and things from their context for study has become all too persistently typical of Western research, a development I will now turn to examine briefly.

CONTEXTUALIZATION

Since the time long ago when the political adage Divide et impera first made its entry into human science, it has managed to maintain its popularity. For more than three centuries, we appear to have accepted that scientific progress depends on ever increasing specialization of research, an ever-finer demarcation of one's object of study.

The development of Western science might perhaps be characterized as a continuous yielding to the temptation of simplifying reality by cutting it up and then reducing it to a basic principle. The advantage of such manipulations is that 'reality' becomes so manageable, predictable and amenable to control. The drawback, of course, is that such partitioning changes the subject matter into something which exists only in the mind of the researcher. The result of this approach has been a diversity of biological, chemical, psychological, sociological, etc. 'explanations' for different aspects of subjects studied, without a way to integrate these various partial explanations into an over-all view. Yet the embarrassing fact of our inability to understand the subject-matter as a whole has failed to spur scientists into a dialogue, as might have been expected. To the contrary, they have preferred to practically ignore the work of other disciplines and to regard the theories and findings of scientists in other fields as irrelevant to their own limited work. It has even become normal practice to speak 'as a biologist' (chemist/psychologist/sociologist/etc.). In this way we encourage ourselves to imagine that such things as a biological, chemical or sociological world actually exist.

In their defense it should be said that practicing scientists have had no alternative. Popper (1961) rightly pointed out that a holistic method is a logical impossibility, because it leads to a regressio ad infinitum. It is not possible to study a subject by taking all its relations into account. Phillips (1977) rubs salt in the wound by asserting that holism is both imperative and unworkable. While philosophers have found it perhaps easy to criticize scientism and historicism in scientific research, scientists themselves have seen no other choice than to carry on with their rigid specializations, undisturbed by work in other disciplines.

Summarizing, there are two closely related aspects of this drift towards compartmentalization in scientific research. We need to consider, in the first place, the conscious sub-division of reality into an ever-increasing number of disciplines and specializations within disciplines and in the second place, a less conscious dividing of subject matter into partial aspects often treated as if they were whole.

The rise of anthropology can perhaps be regarded as an attempt to correct the latter type of division, for anthropology attempts the contextualization of its subject matter. Anthropologists had hopes of arriving at contextualization by carrying out participant observation in fieldwork and by viewing their study-object in its 'natural context', or, as Geertz would say, in its "semantic context." Ironically, the emphasis on direct observation only led many anthropologists to succumb to further partitioning of their subject matter, failing to link what happened before their eyes to macro-structures outside the communities in which they conducted their research. They continued to be hampered moreover by the methodological problem mentioned by Popper. As a net result, despite possible intentions to the contrary, anthropology has become just another discipline, joining the segregated ranks of biology, chemistry, psychology, sociology, etc.

Dissatisfaction with the progressive dissection of reality and consequent estrangement from the world we 'know' has recently led to a number of proposals to transcend old divisions. Wolf (1982:3), for example, has made the following appeal:

> ...The world of human kind constitutes a manifold, a totality of interconnected processes, and inquiries that disassemble this totality into bits and then fail to reassemble it falsify reality. Concepts like "nation", "society", and "culture" name bits and threaten to turn names into things. Only by understanding these names as bundles of relationships, and by placing them back into the field from which they were abstracted, can we hope to avoid misleading inferences and increase our share of understanding.

This paper will attempt to illustrate the validity of Wolf's vision and concern, offering a rough sketch of the interconnection of several processes that impinge on the accessibility of pharmaceuticals in rural Cameroon. It is my wish to urge my fellow anthropologists to conduct research on various levels of organization, to study linkages among international, national, regional and local processes that affect their object of study, and to embark on interdisciplinary cooperation in fieldwork. Because the scope of this article does not allow for detailed description, its main thrust will be programmatic, pointing out the interconthrust will be programmatic, pointing out the interconnectedness of social processes and the need for a contextual approach in studying these processes.

DISTRIBUTION OF PHARMACEUTICALS IN SOUTHERN CAMEROON

Fieldwork took place in 1980 in the Ntem Division of South Cameroon with brief follow-up visits in 1983. It was carried out at different levels, ascending from peripheral family and village life to divisional and national centers of administration. This meant that observations and interviews took place not only in village houses and kiosks, at local markets and health centers, but also at hospitals and pharmacies, and in the offices of the Ministry of Health.(2) In all, six relevant contexts or 'linkages' of medicine distribution were identified. These appear in brief outline below.

1. Health care, pharmaceuticals and state formation

From a political point of view, health care can be seen as an eminent tool for establishing state influence without physical force. Like education, health care can be regarded as a 'peaceful penetration' by the state apparatus on the local level, a means to promote the social cohesion needed for a state to become viable. Godelier (1978) has pointed out that political power does not exist in the physical force of those claiming to have power but in the acceptance of that power by those subjected to it. Power must be regarded as legitimate before we can call it such. If power can be made to appear as a service rendered by rulers, then subjects will consider it their duty to serve those who serve them (Godelier 1978:177). Weber (1947) would call such devotion "uncoerced obedience."

The state of Cameroon is struggling to subdue serious centrifugal forces. One would, therefore, expect its rulers to invest considerable effort in setting up an efficient health care system, thereby making central authority acceptable to the people as an indispensable provider of welfare and health for all. There are several indications that the state is indeed aware of the political potential of 'health for all'. In government institutions, health care, initiating a far-reaching primary health care program and has pledged priority to the extension of rural health care.

In reality, however, the public health care system in rural areas is notoriously inefficient not only when compared to urban facilities, but also when compared to rural health services provided by church-related private institutions. Instead of drumming up support for the beneficent state, public rural health care has become a source of anti-propaganda. For the rural population, but also for health workers (Hours 1982), public medical services all too often have provided proverbial examples of the state's failure to cater to its people's needs. The fact that this failure contrasts sharply with the relative success of private institutions in the field of medicine makes the negative demonstration effect even more pronounced.

Prominent in rural health care delivery is a chronic deficiency of pharmaceuticals on hand. Rural health centers are short of medicines for a great deal of the year. Free distribution of drugs becomes worse than meaningless when government health workers are forced to refer their patients with prescriptions to a commercial pharmacy, one which may be far away.(3) Securing necessary medication may entail the loss of considerable time and money. The failure of the linkage between the political domain and the provision of rural health care is of immediate interest. To understand why, we need to weigh the perceived political importance of drug supply and health care against other factors in the process of state-building.

Perhaps the first thing we need to realize is that the state of Cameroon has not yet completely moved to the stage of legitimation of power by extending public welfare. It still relies on the threat of physical force. In addition in their state-building efforts, the Cameroon authorities are primarily concerned with the potential resistance of urban elements, especially among the ranks of the army and police force. The quality of health care for these groups is conspicuously higher than for the rural population. In fact, 50% of the national health budget goes to the central administration and to hospitals in Yaounde and Douala. Only 7% is spent on rural health care, whereas 71.5% of the population is reported living in rural areas (1976 Census). Finally, we need to realize that until recently the Cameroon government, by following a strictly centralist policy and discouraging local initiatives, has acted consistently to prevent the rise of political consciousness among the rural population. Penetration of state influence at the local level has been pursued mainly through the threat of coercion and by forestalling local self-reliance.

Similar truths emerge when we view urban-rural inequality in health care provision from a center periphery perspective. Research revealed that the more remote a health center was, the fewer drugs it received. The most peripheral health center I visited received just over half the drugs it should have; a center in a rural town of 5,000 received 87%, the hospital in the divisional capital an estimated 90 to 100%, and the central hospitals of Yaounde and Douala even more than 100%. Personnel in outlying health centers did not even know what medicines they were entitled to receive, nor in what quantity. As a result, they were not aware that their allotment of drugs was incomplete. Their remoteness, in a geographical, communicative and bureaucratic sense, made it impossible for them to ameliorate the situation.

2. **Pharmaceuticals and "corruption"**

Corruption --illegal private use of public means-- constitutes an integral part of most, if not all, societies, including Cameroon. Corruption poses extra problems in developing countries, not because it occurs more frequently (which would be hard to prove in any case), but because these countries, with their restricted resources, can less well afford corruption than industrialized ones.

Pharmaceuticals are scarce in Cameroon,(4) and, for that reason, much sought after through corrupt means. Medicines meant for free distribution in public health institutions pass into private hands. This kind of corruption is related to prevailing customs of gift-giving and to how traditional loyalties, mainly kinship ones, prevail over obligations to the state. Another factor is the traditional proprietary view of public office. The most important single force promoting corruption, however, is the overwhelming position of the state as the principle provider of goods, services and employment, coupled with the relative underdevelopment of the private commercial sector. The education gap between office holders and most citizens, moreover, facilitates corrupt practices.

Pharmaceuticals disappear on a large scale from the public health care system, thus crippling the entire service. A national investigation carried out for the Ministry of Health (MSP 1980) concluded that only about half of all medicines destined for rural health centers arrived there in a state which allowed them to be actually used. The Minister of Health estimated that in 1979 about 40% of state-owned medicines 'disappeared'. My own observations point in the same direction: a massive disappearance of drugs essential for the functioning of official health care. It should further be noted that this deflection of medicines for private use occurs from the highest to the lowest level in the distribution chain - although such practices at the top are almost impossible to prove.

The linkage of pharmaceutical supply and corrupt practices suggests a need for research into state bureaucracy and economy. The concept of a soft versus a 'strong' state might provide another important entry into analysis of the problem of unreliable medical supplies. Sampson, who complains that anthropologists have largely neglected bureaucracy and corruption in their research, supports the position, maintained at the outset of this paper:

> The traditional social science division of labor can partly explain the lack of anthropological research on bureaucracy and corruption. Formal organization (even in their most corrupt forms) have been considered the province of sociologists, political scientists and economists. Anthropologists are left with the peripheral peoples, strange customs, deviant cases, and otherwise anomalous groups (Sampson 1983:65-66).

An important point put forward by Sampson (1983), and before him by Scott (1974), is that corrupt practices can both lubricate the formal system and render it ineffective. In the case of pharmaceuticals in Cameroon, the scale clearly tips toward the latter.

3. Formal and informal supply of medicines

My research in Cameroon disclosed a flourishing informal distribution of medicines, partly interwoven with the formal supply system. It became clear that 'corruption' is often nothing more than the passing of a drug from the formal to the informal supply sector. The informal sector differs from the formal one in many ways. Providers of medicines in the informal sector have no - formal-pharmaceutical training. Their practices, though socially accepted, are illegal. In fact, the medical consequences of informal practices often seem a reason for great concern. A further contrast is that activities in the informal sector appear to be addressed much more immediately to the condition of poor people than do those in the formal sector.

More important than contrasts, however, are the linkages between formal and informal drug distribution. The two are closely intertwined and mutually dependent. This intertwining shows itself in both the 'wholesale' and the 'retailing' of medicines. Drug vendors in the informal sector, for example, purchase their stock from authorized pharmacies and from personnel working in the formal health sector.(6) The transactions involve reciprocal interests. The pharmacist increases his turnover by selling medicines to far-off villagers through unauthorized vendors. Health workers augment their income by selling medicines which were to be given to patients free of charge.

The drug supply to patients is characterized by a similar interconnection between the two sectors. By selling 'free' medicines to patients in their homes, health workers become informal distributors. Knowing no medicines are available at the health center, patients often buy medicines before they visit the center and bring them along. Pharmacists sell prescription-medicines over-the-counter and thus function similarly to informal and unqualified vendors.(7)

The formal, legal supply of medicines relies on and makes use of informal, illegal distribution. The two cannot be separated. Suggestions for the improvement of drug distribution must take the existence of both sectors into account. Formal and informal transactions with medicines are not mutually exclusive, as is sometimes believed, but support one another.

4. Public versus private drug supply

Perhaps the most startling of my research findings was that the supply of medicines functions far better in the private than in the public sector. In the private sector patients pay for medicines. It is in the interest of those who sell to maintain their stock, whether pharmacist, private health center or informal drug vendor. In public health institutions, however, where drugs are given free of charge, personnel have little vested interest in assuring a constant supply of drugs on hand. The unavailability of drugs does not really represent any loss to them; even if health services break down because of lack of drugs, the situation will not affect their source of income. In fact, personnel in public institutions often derive material benefit from such drug shortages: drugs privately sold may add to their income; drugs distributed among friends and relatives may provide future advantages; drugs given to important figures may safeguard their own social and economic security. A temporary collapse of the medical services, moreover, allows health workers to undertake additional economic activities.

A national investigation into the distribution of pharmaceuticals cited lack of a commercial spirit in the public sector (from top to bottom) as the root cause of overall inefficiency.(8) It reported that when drug orders were sent to the central pharmacy in the public sector, delivery took from eight months to more than two years, while orders to commercial suppliers were delivered in three weeks (MSP 1980).

In practice, the Cameroon health care system, designed to serve the poor by providing free services, has turned out to be all too expensive, failing to provide required services and obliging patients to resort to other institutions, at times with considerable loss of time, money and health. Ironically, public health care, with full state support, functions defectively, whereas private health care, with virtually no state funding, functions satisfactorily (cf. Hours 1982, 1985).

5. Pharmaceuticals and Multinationals

During the past ten years numerous publications have analyzed and criticized the marketing of pharmaceuticals in the Third World by multinationals.(9) A leading criticism has been that pharmaceutical companies act purely out of commercial motives while hiding behind a humane facade of wishing to cure illness and relieving pain. Their profit-making is made all the easier by the weak position of consumers in developing countries.(10)

All modern pharmaceutical products in Cameroon are imported; the country depends fully on the international drug industry for its supplies. Studying the shortage of medicines in rural health centers and the abundance of dangerous and useless medicines in the informal sector, it is not immediately clear how these problems are related to the role of drug multinationals. Reports from other developing countries about the proliferation of non-essential (often a euphemism for 'useless') drugs and aggressive market practices by pharmaceutical industries do not seem to hold as true for Cameroon. Yet my research did not include a survey among doctors, pharmacists and other drug prescribers about promotion activities by the pharmaceutical industry. Some caution is necessary, therefore. Elsewhere critics have extensively documented double standards in marketing and revealed the exorbitant sums spent on drug promotion in the Third World. One example is Tanzania where the drug industry spent £12,500 per doctor on promoting its products, an amount far exceeding the annual income of most doctors (Mamdani & Walker 1985:41).

With regard to Cameroon it should be noted that, because the Ministry of Health spends too much of its budget on expensive, non-essential drugs, it is not able to purchase a sufficiency of medicines that are needed. Apparently irrational drug purchasing is owing, among other things, to the industry's ability to manipulate the Ministry's policy which advances the interests of individual policy-makers and the urban elite at the expense of the rural population. This at least, I should point out, was the situation in 1980. Since 1984 a restricted drug list has been introduced for the public sector. Nevertheless this measure seems likely to prove insufficient to restore the drug supply in government health institutions to even minimal levels.

Evaluations from various other developing countries show that exemption of the private sector from an essential drugs program leads to the failure of the entire program, for prescribers as well as users of pharmaceuticals continue to resort to non-essential drugs available in the private sector (Mamdani & Walker 1985:46).

As we have already observed, the existence of an informal sector for the supply of medicines bears a direct relation to drug shortages in the formal sector. Some drugs sold informally compensate for shortages in health centers, others enter the informal sector from those very health centers, thus aggravating their shortages. Moreover, such drugs are usually exempt from proper medical supervision once they pass into the informal system. As a result, valuable drugs may become worthless, even harmful, because they are misused.

It may seem far-fetched to link these problems to the marketing policies of pharmaceutical firms. These firms have reiterated that they cannot be held responsible for what happens to their products in the countries of the Third World. They can only guarantee the safety of their products and the accuracy and adequacy of the information which they provide.(11) They assume that certain designated drugs can indeed only be purchased with a doctor's prescription and that delivery of pharmaceuticals to the private health care sector does not detract from the public sector. This stance, however, pays no regard to the complexity of the health care situation in most developing countries. No company can be sure what will eventually happen with its products, certainly not in the Third World. There are clear indications that, up to 1984, the sale of expensive medicines to the government of Cameroon was detrimental to the supply of drugs needed in rural health care. Since 1984, when an essential drugs program was implemented, the sale of non-essential drugs through the private sector has continued to hamper attempts to achieve an adequate drug supply in public rural health centers. Moreover, how much are 'the safety of products and adequacy of information' claimed by the industry worth, if these products are sold outside prescribed medical outlets?

The policies of pharmaceutical companies may not consciously be directed to promote a haphazard and maladapted distribution of medicines in countries of the Third World, but many present problems in drug supplies certainly derive from that policy. Multi-national companies consistently disregard the problems of drug procurement in the Third World and fail to look for appropriate measures to prevent or to reduce the hazardous and wasteful use of their products.

Recent attempts by developing countries to improve their own public drug supply systems have been resisted by pharmaceutical companies when indicated measures threatened a reduction of their market.(12) One development of particular interest is the International Federation of Pharmaceutical Manufacturers Associations'(IFPMA) announcement that 40 to 50 companies are prepared to supply cheap essential drugs to a selected number of developing countries, including Cameroon. It seems clear, however, that this offer was meant to buy time and forestall anymore radical changes to be possibly imposed upon the industry by the WHO and developing countries themselves. The IFPMA is still 'negotiating', six years after the initial offer. One reason for delay in implementation of the plan is, as a representative of the industry has said, the "completely inadequate organization and systems for procurement, distribution and storage of pharmaceuticals" in those developing countries (HAI 1982: 6). It is significant, of course, that pharmaceutical companies were never known to be bothered by inadequate infrastructures as long as they could sell all the products they wanted to sell.

In conclusion, a linkage between the international pharmaceutical industry and health care in Cameroon villages may not be as directly visible as other linkages, but it certainly is part of the contextual reality which concerns us. It should further be noted that the very unobtrusiveness of the connection contributes to its efficacy!

6. Pharmaceuticals and WHO Policy

In 1977 the WHO published its first official report about a plan for the selection of essential drugs(WHO 1977). The basic idea of the plan was "that the single most important measure needed to cut costs and ensure that drugs are used effectively is to limit the number available to those 'most necessary for the health care of the majority of the population'" (Melrose 1982a:148). It is remarkable that this plan, so widely applauded, has hardly been implemented anywhere, at least not in an effective way. Its world-wide support is not difficult to explain. Limitation of medicines to specific essential drugs would solve numerous health care problems, particularly in the Third World. It would enable governments with restricted budgets to buy sufficient medicines to supply the entire health care system while appreciably reducing the risk of inappropriate drug use. Why then has this admirable WHO plan so rarely been put into effective practice?

By April 1982 (Melrose 1982a:148), 70 countries had adopted restricted drug lists, but in almost all of them these lists could easily be circumvented. Circumvention could be achieved, for example, by allowing "unrestricted" lists in the private sector or by leaving it entirely up to doctors what drugs to prescribe. Underlying reasons for reluctance to enforce restricted lists should be sought in other contexts of drug distribution, particularly those which have to do with political pressure groups (see 1) and multi-national companies (see 5). Policy-makers in Cameroon are caught between two groups with conflicting interests: on the one hand the established elite (commercial, medical, pharmaceutical and political) to which they themselves belong, and on the other the non-organized, most rural, masses. For policy-makers then, the most attractive solution to this predicament seems, for the time being, to be 'rhetorical implementation' of the WHO plan, a solution which has now been put into practice; with the approval of medical and pharmaceutical professional groups the Ministry of Health has drawn up a list of essential drugs. The result is a compromise which leaves physicians free to continue prescribing non-essential medicines, and pharmacists to continue buying - and selling - them. Sufficient appropriate medicines are therefore unlikely to become available in Cameroon villages in the near future.

Summary and Conclusions

This distribution and use of pharmaceuticals have numerous linkages with national and international politics and policies, with the marketing practices of multi-national firms, with the operational problems of bureaucracy, with urban-rural relationships and with various economic factors. Further linkages with the social, domestic and individual cognitive domain of drug consumers, not discussed above, are equally important.

We have seen that effective public health care can be a powerful political binding agent for governments in a relatively early phase of state formation. An adequate drug supply is generally regarded as one of the most prominent features of an effective health care system. In Cameroon, however, the government does not accord a high priority to providing satisfactory health care to the rural areas. Access to necessary medicines is extremely limited in rural communities. It seems that the government is more concerned with the political loyalty of the urban population and of "vociferous" elements which pose a potential threat to its hegemony. For the rural population the main inducement to allegiance still seems to be negative: (the menace of) physical force in the event of disobedience.

Another factor impeding equal access to pharmaceuticals is over-bureaucratization and subsequent corruption. Non-organized small farmers and wage labourers undergo numerous forms of petty oppression at the hands of government-paid officials and health care personnel who have direct access to the medical resources that they need.

Corrupt practices are closely linked with the existence - and intertwining - of a formal and informal sector of drug supply. Pharmaceuticals unlawfully diverted from the - free - formal supply-line become available again in the informal sector, but now at a price and usually without medical supervision. Rural patients are thus at a double disadvantage: financial and medical.

Bureaucratization in public health care is propelled by lack of incentive for efficient fulfillment of tasks. Various kinds of profit that accrue to health workers who perform well in private institutions are absent in public ones. The pursuit of private gain by government health workers rather encourages inefficiency in public services. A shortage of drugs is the most acutely felt consequence for the general public.

The role of the international pharmaceutical industry in the unsatisfactory drug supply is not always easy to pinpoint. My preliminary impression in Cameroon is that the industry's responsibility for inequality in drug access is largely a question of unsalutary neglect: the absence of any concern about the actual usage of its products. How can the industry claim in good faith that it guarantees the safety of its products while at the same time it is so blatantly indifferent to the widespread unsafe use of pharmaceuticals? The question to what extent industry actively contributes to the present problem of unequal drug distribution in Cameroon needs further research.

WHO policy is another international force affecting drug distribution in Cameroon. Developing countries have played an important role in drawing the WHO's attention to their health problems. Indeed the WHO's policy document on essential drugs (WHO 1977) is a forward-going tangible result of concerted efforts to devise ways to alleviate the problem of drug shortage. At the same time, however, most developing countries themselves effectively continue to thwart the WHO's 'prescription' for the realization of a more just and equal distribution of needed medicines. This apparent anomaly in national health policy can best be understood if we view drug distribution in a broad context of political and economic interests. Refusal to implement a restricted drug list for both the public and private sectors, for example, seems to be the result of self-interested pressure by doctors, pharmacists, the pharmaceutical industry, the urban affluent, and various other politically powerful groups.

One of the most intriguing aspects of the unequal drug supply problems not yet touched on in this paper is how rural villagers themselves often help to maintain a situation so detrimental to their well being. Of relevance here are popular notions about the use and efficacy of Western pharmaceuticals, but also the priority given to family loyalty over correct 'behavior' in public office. Mapping the linkage of these cognitive and domestic factors - the 'lowest' levels of social organization - to the higher levels described in this paper presents a formidable challenge for further research.

Technological and economic development in Cameroon has had an ambiguous impact on people's access to health. It has made people more dependent on externally produced pharmaceuticals but, at the same time, it has restricted the access to these pharmaceuticals considerably for a large proportion of the country's population. It has been my purpose to sketch a few lines and linkages to point out the complexity of factors that impede equal access to pharmaceuticals. A second purpose was to encourage a contextual approach to the study of drug distribution in Third World countries. Interdisciplinary research on the context of pharmaceuticals should enlist the services of medical, pharmacological, political and economic scientists and anthropologists.

Viewing pharmaceuticals in a broad context does not only deepen our understanding of problems in drug supply, but also provides important clues for the improvement of drug distribution. The example of Cameroon suggests that 'technical' reforms will not achieve positive results if the wider contexts to which pharmaceuticals are linked do not change. Policies for improvement of the situation should be as 'connected' and 'contextual' as the problems are.

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NOTES

1. The term 'pharmaceuticals' in this paper refers to modern products. One might legitimately ask whether traditional medicines should not be included in any discussion of the political implications of unequal access to pharmaceuticals in Cameroon. The WHO (1978) has advocated the integration of traditional medicine in primary health care, a suggestion which has been widely applauded (e.g. Bannerman et al. 1983). An occasional note of objection, however, has also been sounded (e.g. Velimirovic 1984). On the other hand practical follow-up of this idea of integration has been almost universally neglected. The popularity of the idea should probably be understood as a sign of respect for traditional non-Western medical cultures, whereas the lack of concrete action to apply the idea seems an indication that Western-educated medical and political elites within developing countries have little

confidence in these very same medical cultures. In Cameroon some strongly support the idea of cooperation between Western and indigenous medicine (e.g. Lantum 1979) and the country has an institute for traditional plant medicine research. Yet, no practical results have yet led to changes in the country's national health policy. Outside the formal system of health care, however, people continue to use traditional medications, either because for the treatment of particular ailments these are preferred to modern ones, or because modern drugs are not available. More precise information on the use of indigenous medicines, compared with modern ones, however, is lacking. It seems likely that such use is declining and that-perhaps valuable - traditional medical knowledge is disappearing.

2. Research results have previously been published elsewhere. See, for example, van der Geest 1981, 1982, 1985, 1986 and n.d.

3. To alleviate this geographical problem the government encourages local communities to set up 'propharmacies', small medicine shops near public health centers. These propharmacies, which have a non-profit character, have by and large proven to be a dubious means of drug distribution (van der Geest 1983).

4. The Cameroon government spends 12% of its health budget on medicines (1980). Most developing countries spend considerably more. Information on this issue is contradictory, but for many countries WHO reports figures as high as 40-60% of the health budget (Melrose 1982a:207).

5. Elsewhere (van der Geest 1982) I have discussed this problem more elaborately.

6. This phenomenon has been observed in almost all countries of the Third World. To mention a few examples: Mexico (De Walt 1977; Logan 1983), El Salvador (Ferguson 1981), Jamaica (Mitchell 1983), Brazil (Group for Defense 1984), Ethiopia (Kloos 1974), Mauritius (Sussman 1981), Thailand (Weisberg 1982), and the Philippines (Hardon n.d.).

7. The intertwining of formal and informal drug supply in Cameroon is discussed extensively in van der Geest 1985.

8. The lack of incentives and rewards as a debilitating factor in the public health sector of Cameroon is also mentioned in two unpublished World Bank reports (Awantang 1981 and 1983). Similar views are expressed by Ugalde and Homedes (n.d.) with regard to public health care in the Dominican Republic.

9. It is impossible to mention them all, but among the most important are Gish & Feller 1979; Melrose 1982a; Muller 1982; and Silverman et al. 1982. Health Action International (HAI), a consumers' organization, has published a considerable amount of evidence against the pharmaceutical industry.

10. The consumer movement is a common phenomenon in Western industrialized countries but not in the Third World. Only recently have Western-based consumer action groups started to extend their activities to developing countries. A prominent example is Health Action International (HAI) which has been particularly active defending Third World consumers against expensive, useless and dangerous pharmaceuticals. An awkward problem, however, is that very little is known about the needs and wishes of Third World consumers themselves. Much socio-medical research remains necessary to ascertain "the interests of Third World consumers".

11. The adequacy of information on drug indications and counter indications has been challenged as well (see, for example, Silverman et al. 1982).

12. The case of Bangladesh is well known. When the government of that country implemented a new drug policy stressing banning the sale of expensive, non-essential drugs, pharmaceutical firms exerted considerable pressure to have the policy repealed (Chetley 1982; Melrose 1982b; Rolt 1985; Tiranti 1986).

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SUMMARY

The author pleads for a contextual approach to the study of pharmaceutical use and policy. To illustrate this approach, distribution of medicines in rural South Cameroon is examined. Discussion shows how existing problems are linked to national and international policies, multinational and international policies, multinational marketing practices, bureaucratic entanglements, urban-rural relationships and various additional economic factors.

FOOD AND NUTRITION

INFANT FEEDING PRACTICES IN MEXICO

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INTRODUCTION

During the last fifty years there has been a significant decline in the practice of breast feeding, a traditional component of infant care. Diverse types of infant formulas based on cow's milk have saturated the market, and bottle feeding is replacing breast feeding. Many controversial discussions have taken place around this complex phenomenon. Unfortunately, much more has been said than done.

The nutritional value of breast milk and the importance of breast feeding for the overall growth and development of infants are widely recognized. The disadvantages of bottle feeding are also well known. The great potential for contamination of water used in bottle feeding and the resulting gastrointestinal diseases have been documented in many countries. The possibilities of over-dilution of formulas, and its effects on undernutrition and higher morbidity and mortality rates have been also illustrated in the Third World. The high cost of bottle feeding to the family and to society is another dimension that has raised serious concerns. Today, it is clearly understood that bottle feeding constitutes a high-risk practice, and that breast feeding should be promoted for the great majority of women, perhaps for as many as 95%, and that it should be sustained as long as possible, at least for the first six months of life. Yet, many physicians, particularly pediatricians, and also many nutritionists, are still not convinced. It is no wonder that policy makers have not pressed for large scale public campaigns on breast feeding. In the meantime, it is useful to continue collecting information about the factors which contribute to the decline of breast feeding and to analyze the socio-economic conditions that determine life styles and daily feeding practices of infants.

Previous research had identified the following factors contributing to the decline of breast feeding: 1) the increase in number of women entering the labor force which has produced important transformations in family structure, particularly life styles and eating patterns. 2) The influence of pediatric and medical advice in recommending infant feeding formulas, and its effect on the early suspension of breast feeding. Several authors have documented that physicians, and health personnel in general, erroneously contributed to the misconception that formulas were superior to breast feeding. However, it is now well known that the reduction in infant mortality during the first half of this century from 150 to less than 20 per thousand live births in industrial nations, was due to a combination of factors such as socio-economic improvements in living conditions, sanitation, housing, water supplies, medical care, the beginning of the child welfare movement and the education of mothers in better child care and feeding practices. Improvements in living conditions coincided with greater safety of milk and infant formulas which made possible bottle feeding. The studies of Elizabeth and John Newson (Aykroyd 1977) illustrate this point:

It is clear that the necessary precondition of any large scale decline in breast feeding is the availability and cheapness of suitable artificial or substitute foods, feeding bottles, and the means of sterilization. With higher material standards of living including running water, efficient sanitation, modern stoves, it requires little effort to take the necessary hygienic precautions, and in a more affluent society the total cost of artificial feeding is no longer an important consideration.

These conditions are in stark contrast with those found in the Third World. 3) Several studies have also indicated that urban life styles, with different concepts of comfort and modernization, have also contributed to the decline of breast feeding. 4) The influence of mass media communications and advertisement, have also been cited as an important factor in the decline of breast feeding and 5) the publicity and promotional strategies of the infant formula companies have assumed the greater responsibility in the shift from breast feeding to the use of infant formula. Most authors coincide in referring to the great economic interests behind the decline of breast feeding in favour of the bottle (Bader 1976; Berg 1973; Garreau 1977; Grupo Tercer Mundo 1980).

There is also much controversy in regard to weaning practices. Pediatricians and many nutritionists have advocated early introduction of solid foods, following concepts developed in sophisticated medical centers. It is common, for example, to advise mothers to feed infants with diluted fruit juices as early as two weeks after birth, to start fruit and cereal purees at the second month, and vegetables, egg yolk, and pureed meats afterwards. This trend is particularly prevalent in urban middle and upper class groups with access to pediatric care, either private or institutional (Wade 1975). In contrast, in rural and poor urban areas, solid foods are introduced to the child's diet later, at about the age of eight months. In the 1950s and 1960s many health professionals thought that undernutrition and high frequency of diarrhoea were due to a later introduction of solid foods. These views contributed to the decline in breast feeding and to a lack of confidence in the traditional feeding practices (Sanjur 1970; Chavez et al. 1975; Plank 1973; WHO 1981). The baby food companies have also built on the advantages of this situation, as well as working mothers' needs for quick and easy infant foods, to increase their volume of sales which has meant more publicity and further undermining of the prestige and value of traditional weaning foods and habits.

In Mexico the traditional weaning foods consist of corn products such as atole (a corn beverage made of cornmeal or tortilla meal), of broths and juice of different vegetables, of beans and of available meat products. Since these practices coincided with low weight for age of infants and frequent episodes of diarrhoea, once again a superficial cause-effect relationship was constructed and much of the medical advice and nutrition educational efforts were oriented to changing these traditional infant feeding practices in favor of Western sophisticated patterns (Brown 1977; Berg 1977; Jelliffe 1971).

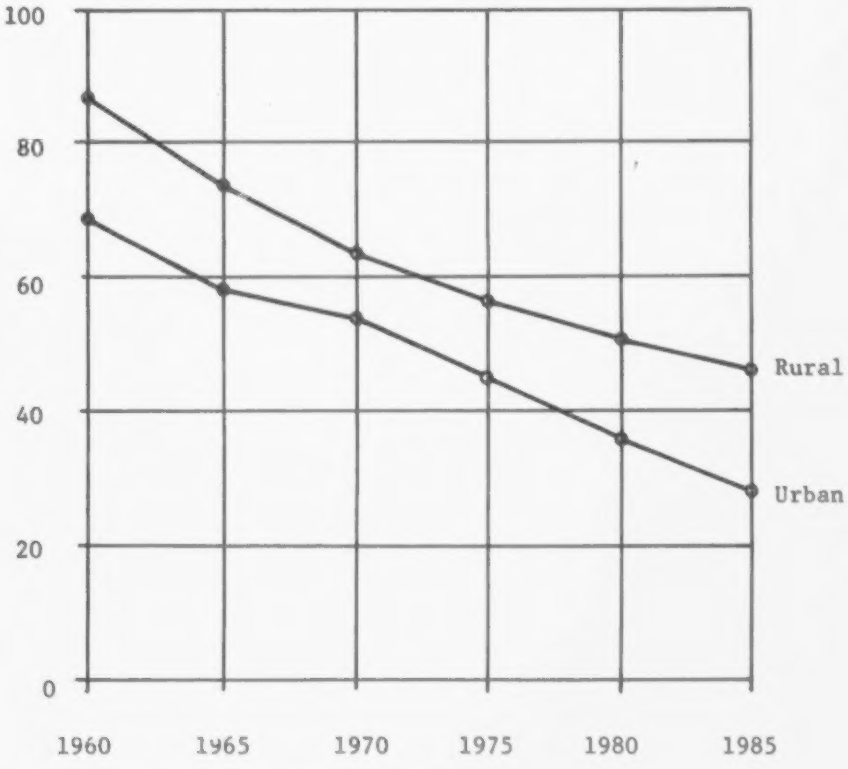
Half a century of public health activities based on partially erroneous "professional" advice has left its influence in changing food practices and child care. Even today when these concepts have been seriously questioned and are considered damaging to the growth and survival of infants, the medical and nutrition programs at leading universities and higher education medical institutions still persist in teaching them to new health professionals (Mata 1984).

RECENT TRENDS IN BREAST FEEDING PRACTICES IN MEXICO

Several studies have documented a decline in breast feeding in Mexico during the last twenty to thirty years (see Figure 1). From 1960 to 1966 the percentage of women who breast fed their babies during the first six months decreased from 95% to 73% (Berg 1977). In the early seventies a study of women in Mexico City who received medical care at the Mexican Institute of Social Security (IMSS) reported that only 38% had breast fed their last infant for at least the first four months of life (Avila 1978). A similar study revealed that in Guadalajara (the third largest city in Mexico) only 36% of women who received medical care at the IMSS had breast fed their infant for at least three months (Magana 1981). The reasons cited for not breast feeding were similar for both groups studied,

FIGURE 1

CONTEMPORARY PATTERNS OF BREAST FEEDING IN MEXICO*



YEAR OF PUBLICATION

*Frequency of breast feeding as reported by the studies cited, including the results from the National Survey of Food Habits, 1983.

many were due to the advise given to mothers at the IMSS. In the two cities, respondents indicated that the work of the mother outside the home was one of the most important factors for not breast feeding or for its short duration. It should be mentioned that working mothers who are affiliated with the IMSS enjoy three months of maternity leave, although leave is usually taken several weeks before the delivery, thus shortening the post-partum time for breast feeding.

Other reasons reported in these studies for the decline of breast feeding were: lack or insufficiency of milk, and rejection by the baby. The authors also indicated that 75% of women that did not breast feed at all mentioned that health personnel at the IMSS recommended and distributed formula for bottle feeding. This information coincided with the data from the IMSS according to which 75% of mothers were using formula. Similarly, a majority of women, who had stopped breast feeding before the third month of life of their newborn, reported that they were encouraged and given the formula. Only recently, the IMSS has reportedly discontinued recommending bottle feeding.

During the past decade, a study of women in marginal urban areas in Mexico City revealed that 55% of them had breast fed their last infant for at least six months (Vega 1977). Mariscal (1977) in a different study also reported that 60% of mothers from low income urban areas had breast fed for a period of six months. It is important to indicate that most residents in marginal urban areas are immigrants from rural communities, and still maintain many rural customs and traditions. Studies of changing food habits of migrant populations, show how quickly urbanization and acculturation erodes appropriate traditional practices and how easily they are abandoned (Cerqueira 1978 and 1984).

The results of the national survey of family planning and use of contraceptives at the end of the 1970s and early 1980s shows that 22% of the women interviewed had not breast fed their last child. Of the 77% of those who reported initiating the practice of breast feeding, only 53% in the urban areas and 35% in metropolitan areas (specifically Mexico City, Monterrey and Guadalajara) had breast fed for at least six months (Garcia 1981).

THE NATIONAL SURVEY ON INFANT FEEDING PRACTICES

Considering that infant feeding practices, particularly breast feeding and weaning, are fundamental for the adequate growth and development of children, a survey of these practices on a national scale was undertaken. One of the purposes of the study was to establish a base line to further develop a surveillance system of changes in food habits and patterns. A sample of 9,300 women with children under three years of age was invited to participate, 62% were from marginal urban areas and 38% from rural communities. Excluding the participants from Mexico City, 52% of the sample was urban and 48% rural. The sample was drawn taking into consideration the proportion of rural to urban populations at the state and national level established by the 1980 National Population Census. Of the 9,300 questionnaires 7,622 (85%) were processed and analyzed.

The majority of the participants, both in rural and urban areas, were between 20 and 30 years of age (see Table 1). Approximately 10% of the women studied were less than 19 years old and about 20% were over 35. In other words, about 30% of the pregnancies could be considered high risk pregnancies.

The educational levels of participants is presented in Table 2. The majority of the participants reported that they work exclusively in domestic chores. Nonetheless, it was interesting to note that more than 32% of the participants indicated having a remunerated job outside the home and over 28% reported that, besides the paying job, they were also responsible for the care of their households (Table 3). The entry of women into the labor force is a fact of this century, a permanent characteristic of modern society. This phenomenon implies profound changes in the organization of the family and in eating patterns. As has been indicated above, previous studies have reported that the work of women outside the home was one of the basic reasons for the decline of breast feeding; however, based on the information collected in this survey, there must be other factors more important. This survey showed that 68% rural and 40% urban respondents did not have employment outside the home. Later we will show that only 16% rural and 25% urban mothers claimed that work outside the home was an

TABLE 1

Age of Respondents (in percentages)

Age in Years	Rural	Urban
15 to 19	9	12
20 to 24	25	30
25 to 29	23	25
30 to 34	18	16
35 to 39	15	10
40 and more	9	7
TOTAL	99	100
(n)	(2,906)	(4,716)

TABLE 2

Formal Education of Interviewees (in percentages)

Years of School Completed	Rural	Urban
None	16	10
1 to 3	37	25
4 to 6	28	36
7 to 8	13	14
9 to 10	4	10
11 and more	2	6
TOTAL	100	101
(n)	(2,906)	(4,716)

TABLE 3

Occupation of Interviewees (in percentages)

Type of Work	Rural	Urban
Household chores	68	40
Outside work	5	32
Both	27	28
TOTAL	100	100

important cause in their decision for not breast feeding, and/or weaning their infants at an early age (see Table 6).

Studies in several Latin American countries indicate that women in the labor force tend to have fewer children and enjoy some fringe benefits such as maternity leave and time for breast feeding at work. This is an area that requires careful examination for, in reality, not all working mothers enjoy maternity benefits. Such is the case, for example, for women working in domestic services and in many other occupations not covered by social security benefits.

RECENT TRENDS IN BREAST FEEDING PATTERNS

Approximately 70% of the mothers indicated having an infant between seven and thirty six months of age and 30% reported their youngest child was less than six months old. It is interesting to note that at the time of the survey only 27% of the rural and 19% of the urban mothers indicated they were actually breast feeding (Table 4).

A retrospective analysis of the early feeding practices shows that 32% and 20% of the participants, in urban and rural areas respectively, had not breast fed their last child, which meant that those children were exclusively bottle fed from birth (Table 5). Approximately 35% and 42% of the mothers interviewed in rural and urban areas, respectively, indicated having initiated breast feeding and suspended it before the third month of the infants' life, complementing and substituting breast milk with formula and bottle feeding. Thus, more than a third of the participants interviewed were considered to have practiced a mixed form of lactation.

These results indicate that only 25% of the urban and 46% of the rural children received the protection, nutritional content and benefits of breast feeding for at least three months. Furthermore, only 8% in urban areas and 22% in rural communities were breast fed for more than six months. By current nutritional standards this means that only one of every two rural children and one out of every four urban infants had adequate food and nutrition care and an optimum mother-child relationship during the first months of life.

Table 4

Age of Youngest Child of Whom Infant Feeding Practices are Described (in percentages)

Age in Months	Rural	Urban
0 to 3	7	9
4 to 6	22	25
7 to 12	22	26
13 to 23	31	28
24 to 36	17	12
TOTAL	99	100
(n)	(2,906)	(4,716)

TABLE 5

Breast Feeding Practices of Interviewees

Type of Lactation (date of weaning)	Rural	Urban	Total
Exclusive breast feeding (3 to 6 months)	24	17	21
Exclusive breast feeding (7 months and more)	22	8	11
Mixed lactation*	35	42	38
Exclusive bottle feeding	20	32	30
TOTAL	101	99	100

*Both bottle and breast feeding from 0 to 3 months

The mean age of weaning for the urban group was reported at 4.7 months (median 3.2); for the rural mothers it was at 7.6 months (median 6.2). As shown in Table 6 the main reasons given by the participants for abandoning breast feeding were: lack of sufficient milk (19%), illness of the mother (14%), rejection by the child (10%), medical advice (14%), work outside the home (22%), and lack of knowledge and confidence (21%). It can be seen that a significant number of mother gave work outside the home as the reason for abandoning breast feeding; however, it should also be noticed that only 43% of mothers who reported having a job outside the house did not breast feed. It may be possible that the decisive factor for failing to breast feed or for its termination was not the job itself but the tension and responsibility of the double work load (one outside and one at home). It could also be argued that those mothers who used the maternity leave before the delivery, found themselves without leave time after the delivery for breast feeding. Another factor that requires a careful analysis is the conditions surrounding breast feeding at work. Some respondents indicated that some institutions had a policy of authorizing work breaks for mothers to breast feed but that there were no facilities near the work place to keep the babies. In large cities such as Mexico City these conditions make impossible breast feeding as mothers cannot go back to the house to nourish their infants.

It is of interest to examine more closely those 57% respondents who were able to work and breast feed for more than three months. Their experience could be useful to the others. On the other hand, those 22% who did not have jobs outside the household and failed to breast feed their last child could very likely benefit from health education programs.

About 25% of the rural and 20% of the urban mothers reported different causes for not breast feeding and/or for having suspended lactation before the infant's third month of life. The multiple reasons were grouped in the category "lack of confidence and knowledge" (see Table 7). Considering the larger number of participants in this category it will be very beneficial to study these attitudes and develop educational messages to help these mothers to positively change them.

TABLE 6

Principal Reasons for the Abandonment of Breast Feeding (in percentages)

Reasons Indicated	Rural	Urban	Total
Lack of milk	19	19	19
Mother's illness	17	12	14
Work outside the home	16	25	22
Rejection by infant	10	11	10
Medical advice	14	14	14
Lack of knowledge and confidence	25	19	21
TOTAL	101	100	100

TABLE 7

List of the Most Frequent Responses in the Category "Lack of Knowledge and Confidence" about Breast Feeding (ranked by frequency of responses)

1. My milk was not good
2. The baby was still hungry or was not satisfied
3. I didn't have enough milk
4. I didn't have any more milk
5. I didn't have any more milk because of a problem that caused grief, sorrow or anger
6. My breast hurt and bothered me
7. I was afraid that my breasts would be ugly
8. The baby cried and I thought he was still hungry
9. I was pregnant with another child
10. The baby got diarrhoea
11. My breasts would get deformed
12. I was given formula to bottle feed the baby
13. My husband didn't want me to breast feed
14. The bottle was easier for me to take out
15. My husband didn't want me to be seen breast feeding

The participants who bottle fed their infants from birth and those who stopped breast feeding before the third month used different types of formulas based on cow's whole milk (powdered, evaporated or fresh) and formula. Table 8 shows mothers who used formula and the types of milk used by rural and urban groups. The frequent use of whole milk in the first months of life of the infant is of grave concern because recent studies have revealed that cow's milk and formula are a poor source of essential fatty acids, particularly linolenic, which is an indispensable element in the early stages of development. As has been mentioned earlier, in today's economic conditions, most low income mothers cannot afford to purchase the necessary amount of milk or formula for the adequate growth and development of infants. Additionally, in Mexico, like in many other Third World countries, the availability of clean water and the possibility of sterilization of the bottles is problematic. The inability to read, interpret and follow the instructions on the package label also raise questions about the appropriateness of bottle feeding. In conclusion, it is most likely that a large percentage of Mexican children are fed over-diluted formulas mixed with non-potable water in dirty bottles. In view of these realities, if the shift from breast to bottle feeding continues at the present rate, it can be predicted an increase in the number of undernourished children with diarrhoea or higher rates of morbidity and possibly mortality and, certainly, higher medical care costs (Cunningham 1977; Larson 1978).

WEANING PRACTICES

For purposes of this study we have classified weaning foods in three categories: adequate, permitted and inadequate. Adequate foods are those considered nutritional for infant feeding. They are basically natural foods that complement and enrich the infant's diet with a minimum of processing and little, if any, artificial flavoring. Among adequate foods we include cereals such as cornmeal, rice, noodles in soups and stews, bread, tortilla, atole, and beans in soup and puree, different vegetables, fruits, juices, meats, eggs, fish, milk and cheese.

Permitted foods are those that provide basic energy but due to a lack of variety, poor combination, or high

TABLE 8

Types of Bottle Foods Used by Interviewees (in percentages)

Type of Bottle Foods	Rural	Urban
Formulas	38	52
Whole powdered milk	32	18
Whole fresh milk	23	21
Evaporated milk	5	7
Condensed milk	3	2
TOTAL	101	100

costs in relation to its nutritional value are considered less desirable for a good diet. In this category are included foods which are reported as the only food item in the infant's diet. Here we include refined cereals, starchy foods, canned fruit juices and beverages, commercial baby foods, broths and the liquid from preparing vegetables, sweets and candies. Inadequate foods are those which may be damaging the infant's health and those which are used in place of more nourishing products. In the list we include sweets, candy, refined products, soft drinks, carbonated and alcoholic beverages, broth alone, tea, coffee, the use exclusively of commercial baby foods and those products commonly classified as "junk foods."

In the urban areas about 21% of the interviewees and 5% in the rural communities began the use of solid foods at what is considered to be an early age, or before the third month of life. At the opposite end, 50% of the respondents in urban areas and 64% in rural communities introduced foods at a late age or after the child's eight month. Thus, only 30 and 33% of respondents in urban and rural areas respectively indicated the introduction of solid foods at the proper time. Tables 9 and 10 present the age at weaning by the adequacy of the foods used in rural and urban areas respectively.

The introduction of adequate foods at the proper time is an important aspect of child nutrition. If foods are introduced too early, the possibilities of contamination and the susceptibility of infection increases (diarrhoea is a common episode that might follow). Early introduction to solid foods has been associated with obesity later in life. On the other hand, if the introduction of solid foods is too late, breast feeding may be insufficient to maintain adequate nutrition, growth and development. The results of the survey show that only 23% of the participants in urban areas and 21% in rural communities introduced adequate and permitted foods between the fourth and the eighth month of age.

The participants interviewed reported that the very first food that the infant tasted, besides milk (mother's or formula) were almost exclusively cereals: tortillas, noodles, different preparations of cornmeal, and bread to be followed

TABLE 9

Adequateness of Food and Age of Introduction to the Child's Diet: Rural Interviewees (in percentages)

Adequateness of Foods	Age of Introduction (in months) Early (0-3)	In Time (4-7)	Late (8-12)	Very Late (13 +)	Total
Adequate	2	10	12	10	34
Permitted	2	12	8	12	34
Inadequate	1	10	11	10	22
TOTAL	5	32	31	33	100

TABLE 10

Adequateness of Food and Age of Introduction to the Child's Diet: Urban Participants (in percentage).

	Age of Introduction (in months)				
Adequateness of Food	Early (0-3)	In Time (4-7)	Late (8-12)	Very Late (13+)	Total
Adequate	9	10	8	6	32
Permitted	6	11	11	9	40
Inadequate	5	9	9	7	29
TOTAL	21	30	28	22	101

by fruits and soft drinks. Thus, in order of importance and preference, mothers selected high energy foods (see Figure 2).

That a large number of mothers weaned their infants with broths, liquids from boiled vegetables, beans and meats suggests that urban mothers still have strong rural habits and fear the introduction of solid foods which can be explained by the fact that many of the inhabitants of poor neighborhoods in the cities are rural migrants. It should be of concern to nutrition policy makers that so many mothers spend their meager resources buying commercial baby foods which most likely are insufficient to provide an adequate diet for the child. Juices, soft drinks and candies were also high on the list. All these foods are easy to prepare but lack the organoleptic and sensory qualities so important in the early state of development.

THE POLITICAL ECONOMY OF BOTTLE FEEDING

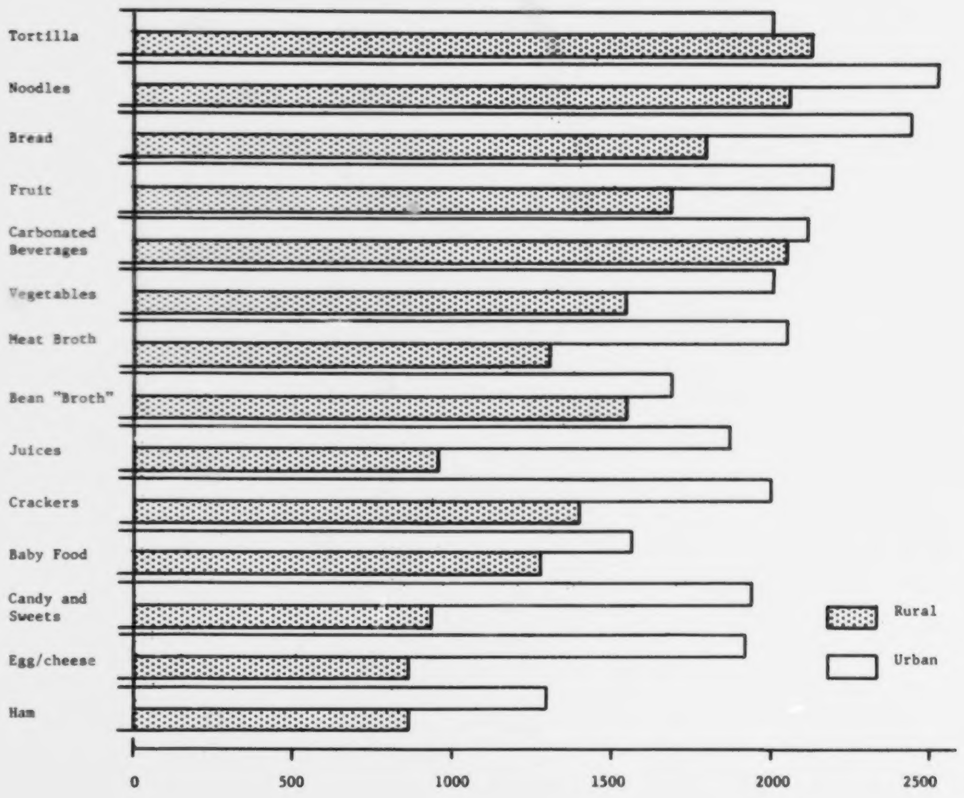
Finally, the most important factor because of its influence both on the criteria of health professionals and medical institutions' policies, as well as for the changing cultural and psychological attitudes of mothers towards breast feeding, were the promotional and advertising activities developed by the multinational formula corporations in Latin America (Grupo Tercer Mundo 1980).

Although in Mexico straightforward advertising of formulas is not permitted in the mass media, marketing and promotional campaigns through health personnel and medical institutions are a widespread practice. Television commercials advertising bottles and other baby equipment are frequently aired. At the same time, international and institutional feeding programs have distributed large quantities of powdered milk and formula for bottle feeding of infants. Ironically, they have done so in an attempt to alleviate the problem of undernutrition, especially infant malnutrition.

The widespread and aggressive advertising and sales promotion strategies used by multinational corporations through health professions and institutions in Latin America as well as directly with their "target populations" have been

FIGURE 2

THE FIRST FOODS INTRODUCED TO THE INFANT'S DIET



well documented and in this regard, Mexico is no exception (Butz 1977; Berg 1977; Grupo Tercer Mundo 1980). The business dimension of infant formula is also of interest. In the decade of the seventies, there were four corporations in the formula market in Mexico. Liconsa, a public, nationally owned company, had only 8% of the sale in 1979. The other three companies were of private, foreign ownership (Nestle 59%, Wyeth Vales 20% and Mead Johnson 13%). Nestle reported 97% of the sales of powdered milk and Liconsa 3%; of the evaporated milk category, Carnation reported 72% and Liconsa 28% (SINE-SAM 1980).

Sales of baby milks and formula showed a 5% increase in utilities over sales operations with a net profit above investments of 24 points from 1975 to 1979. Between 1976 and 1977 there was an increase in volume of operations of powdered milk of 22% and for 1978 the increase was 28%. The increases for formula were 16% for 1977 and 19% for 1978.

In 1980 a can of powdered whole milk cost about one third of the official minimum daily wage and a can of formula was equivalent of 40% of the official minimum daily wage. Thus, to provide bottle feeding for the infant, including utensils, fuel, etc., a family had to spent approximately 40 to 50% of their salary.

The estimated economic loss for the so-called "developing countries" caused by the decline in breast feeding was calculated in close to the billions of dollars (Berg 1973). Considering that 30% of the participants in the present survey did not breast feed and that about 2 million children are born in Mexico each year, it can be concluded that Mexico spends approximately 60 million US dollars to bottle feed these 30% of the children for the first four months of life (the methodology used is described in FAO 1979). Furthermore, based on the results of this survey another 30% of the mothers interviewed did not breast feed more than six months. This figure adds 220 million US dollars to the bottle feeding tag for children during the first year of life.

The advertising business has also had its share of the responsibility in the decline of breast feeding. As was mentioned, formulas are not permitted to be advertised on the radio or television; however, whole powdered milk, cereals, baby bottles and other utensils are freely publicized in the media. According to a report on modern multinational advertising corporations, eight of the ten largest and most important publicity agencies, mainly of U.S. ownership, have operations in Mexico. The annual rate of growth of operations increased by 8% in the U.S.A. and 10% in foreign countries. In contrast, their investments were 63 thousand million dollars in foreign countries and 62 in the United States. The report also states that between 30 and 51% of the profits were generated in Latin America (UN 1979).

According to the UN report (1979), as the advertising businesses grow so do the privately owned media corporations and together they control the content of news, information and also the programs that the general public can "choose" to view. Commercials have a persuasive intention. Their impact has been to create life styles that shape consumer decisions and preferences, but also to create superficial needs and conveniences including baby foods.

CONCLUSIONS

Mexico reports high infant mortality rates due to diarrheal disease and although the rate decreased form 1970 to 1979, the total number of lives lost represent over 40,000 children per year that died from diarrhea (PAHO 1982). The direct relationship between the decline in breast feeding, the increase in bottle feeding and diarrhea in infancy has been well established. Thus, it can be said that the decline in breast feeding, together with lack of sanitation, clean water and an adequate nutrition are the contributing factors in the death of over 50,000 children each year in Mexico.

A second feature identified as responsible for the decline in breast feeding has been the changes in life styles due to a massive urbanization and modernization, particularly related to women working outside the home and to the influence of the media, radio, television and the press. Although the abandonment of breast feeding was primarily considered an urban phenomenon, recent studies including the results of this survey, show that in rural communities there is also a significant decline in breast feeding. One of the culprits charged in relation to women entering the labor force, was not so much because mothers worked as that bottle feeding was viewed as one of the sophistications of city and modern life, especially associated with middle and upper class groups. Studies with groups of rural immigrants to the cities show how readily the bottle feeding trend has been adopted and also how rural mothers have also been influenced by this acculturation. Often breast feeding was considered old fashioned, a backward and vulgar practice identified with the poor and "less educated" rural populations.

Anthropologists have used the duration of breast feeding as an inverse measure of acculturation particularly in studies with rural and ethnic groups in Mexico and other Latin American countries. It seems that bottle feeding was "manufactured" into a symbol of progress and wealth. In fact the salesmanship of bottle feeding has even been able to convince mothers that it is "easier" and "healthier" than breast feeding. Of course, for this fact, they had the help of many health professionals.

Failure of lactation has been reported as a response to the stress of modernization. The results of this survey show that an important percentage of the participants reported (20%) a failure to initiate and or continue to breast feed. It seems that the tension of a complex urban environment affects mothers' capacities to produce milk and breast feed.

Changing social attitudes regarding physical body contact and the "revealing of breast" also seemed to influence the decision not to breast feed. Thus many participants considered that breast feeding would damage the appearance of their breast. It is interesting to note that much time, effort and resources are invested in massages, exercises and other body treatments to beautify the breastline as a sexual symbol, yet, it has not occurred to women that breast feeding is also a form of exercise, free of charge.

It was particularly interesting to note that husbands were reluctant for their wives to be seen breast feeding. Nursing in public, a common sight a decade ago, is rapidly disappearing as a superficial sense of modesty increases. The "modern, well-to-do white man's wife does not breast feed in public" seems to be the unspoken message in imported television programs, movies and commercials. "Blond, blue-eyed babies come from a bottle with formula" could also be one of the unspoken messages. Perhaps a study of the semiology of social codes in relation to this could shed some light on the decline of breast feeding.

A mistaken sense of convenience was also a factor reported by some of the participants interviewed. It would seem that the working mothers would be the most in need of fast-easy methods to feed the family. In this survey the percentage of working mothers was relatively small, nonetheless, it would seem obvious that breast feeding had greater advantages in terms of convenience as studies show that bottle feeding takes at least three times more time and effort than breast feeding (FAO 1979).

In conclusion, a number of factors that have influenced breast feeding practices in Mexico have been identified. It is clear that several of these factors can be addressed through appropriate health education programs directed not only to the mother but to the general population. A mother's attitudes toward breast feeding are not formed independently but reflect those of her significant others and general societal values. The survey results demonstrate clearly that complex intertwining of factors that are tied to the process of modernization and development and its effect on the nutritional health of Mexico's infants.

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MODERNIZATION, AGRICULTURAL EXPORTS, FOOD AVAILABILITY AND NUTRITION IN CENTRAL AMERICA: 1960-1980

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Much of the nutrition research effort in the Third World has addressed the study of the effects of malnutrition on physical and mental growth--particularly on children--and on economic development. Efforts have also been made to improve our understanding of what could be labeled, in very general terms, the biological causes of malnutrition. The Pan American Health Organization noticed the emphasis on these areas and wrote in a policy statement "...nutrition specialists have concentrated all their efforts almost exclusively in learning the physiological, biochemical, and behavioral mechanisms related to malnutrition" (OPS 1976:3). In contrast, the study of the socio-political causes of malnutrition has been given less attention, even if for some time it has been acknowledged, and today is well accepted, that protein-caloric malnutrition is basically a problem of poverty. In 1979 the Institute of Nutrition for Central America and Panama (INCAP) celebrated the thirtieth anniversary of its foundation and issued a catalogue of its scientific publications: the impressive list contains 2,454 titles, but the reader can search in vain for materials regarding the political economy of malnutrition in Central America (INCAP 1979).

The politics of agricultural modernization and food production began to receive attention in the seventies when the failures of land reform implementation became obvious (Sinha 1977; Hopkins et al. 1979; Rama and Vigorito 1979; Mayer and Dwyer 1979; Burbach and Flynn 1980; Montañez et al. 1983 and many more). However, the works of Lappé and Collins (1977) and George (1977) linked for the first time, in a systematic fashion, the growing literature reporting the damaging results of agricultural modernization for the poor in the Third World and malnutrition. These authors also raised the issue of the impact of international agricultural trade on malnutrition. More recently, three books (Super and Wright 1985; Browne and Hadwiger 1986; Biswas and Pinstrup-Andersen 1985) include articles in which the relations between agricultural exports and malnutrition in the Third World are discussed.

Traditionally, it has been assumed that the nutritional status of a population is related to 1) the purchasing power of individuals or families, 2) the availability of nutrients, 3) the cultural eating habits, and 4) the health and educational levels of the population. It should be clarified that the concept of availability in the way it is being used in this paper implies more than the physical existence of nutrients, it means that the available nutrients are financially affordable to the population. For example, in Cali (Colombia) for many years, because many poor people could not afford to pay the price that producers alleged to be financially required, fresh milk was routinely dumped into the sewerages. Development economists have been particularly concerned with items 1) and 2), and have looked at the influences of price and income elasticity of demand on nutrition. Increasing productivity through modernization of agriculture and a shift from subsistence crops to agricultural commodities has been considered by economists and agricultural experts as the most expedite way to increase simultaneously the availability of nutrients and the purchasing power. In the words of Pinstrup-Andersen (1985:43), the commercialization of agriculture is "a cornerstone of successful economic development in most developing countries." It was thought without much additional consideration that reduction in protein-caloric malnutrition would follow.

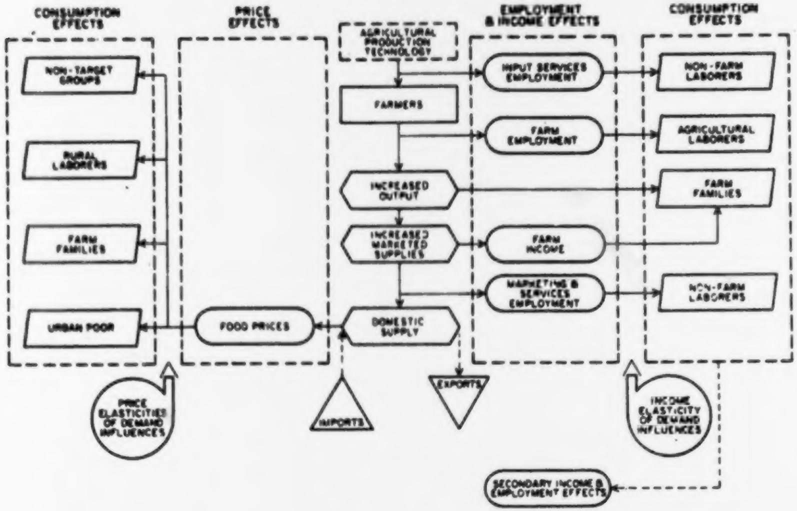
The paradigm by Goldman and Overholt (1981) presented in Figure 1 synthesizes well this approach to agricultural development and modernization. According to the figure, technological agricultural development (TAD) affects positively farm and non-farm employment and income through increased marketed supplies and increased output. At the same time, TAD increases domestic agricultural and food supplies, and produces surpluses for exports. Following the principles of comparative advantages, foreign exchange earned from exports can be traded for food imports, a policy that has been fostered by the World Bank and other international agencies from the industrial nations. Thus, domestic food supplies would increase further and prices would decline (Pinstrup-Andersen 1985:44). Lower prices and higher incomes would affect positively food consumption, and a reduction of caloric-protein malnutrition would follow.

While the logic of the model seems impressive, there are sufficient case studies which question most of its premises and raise serious questions about its validity for many regions of the world. With the information available it is possible to build a tentative contrasting paradigm (see Figure 2).

It has been well documented that TAD has been applied selectively, favoring large agricultural exploitations of cash crops which very frequently are for exports (Caliendo 1979; Posas 1979). In Latin America, for example, output of export crops has increased at times at the expense of the best arable land, which previously had been dedicated to traditional food crops (Barraclough 1977). It has also decreased food consumption among farm families who formerly utilized their production for themselves. The reduction of domestic supplies of traditional food crops might well have increased the prices of these foods and reduced their consumption among rural laborers and urban poor. That modernization of agriculture could have negative effects on nutrition has been documented in Valle de Cauca by Taussig (1978). Also in Colombia, Sanders (1981:88) confirmed that the impact of agricultural modernization on nutrition is negligible. A 1979 report prepared by the U.S. Government Accounting Office (GAO 1979:1) outlined some

FIGURE 1

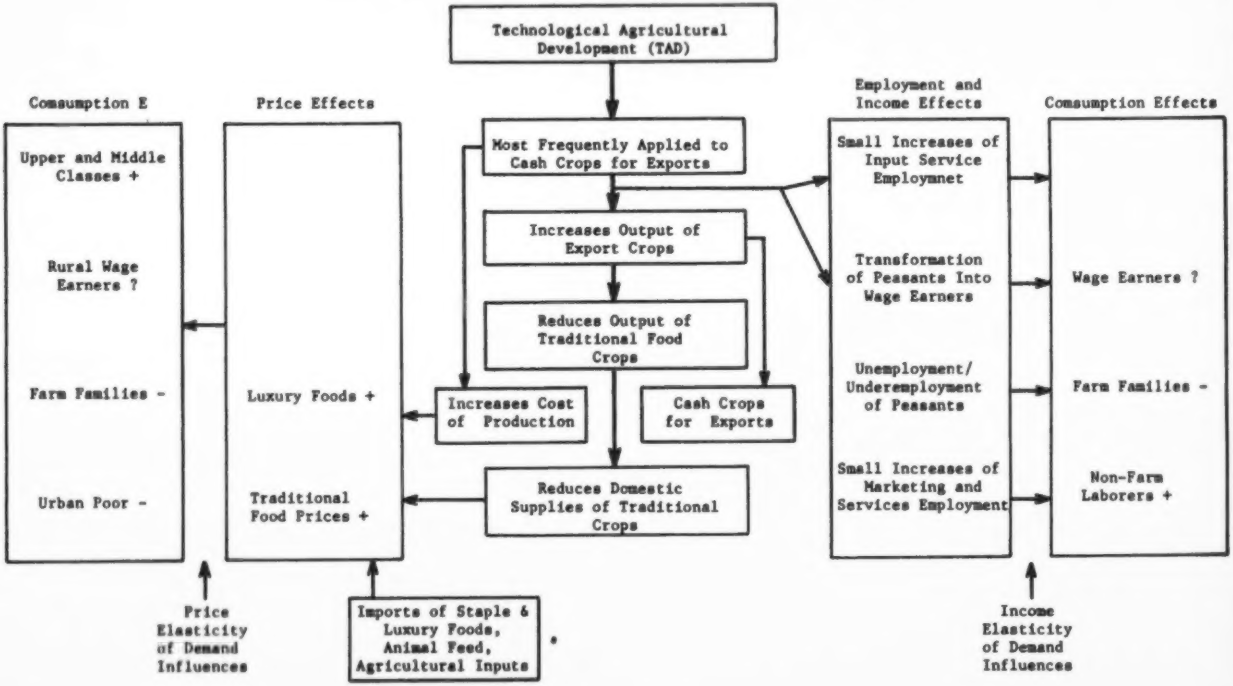
EMPLOYMENT, INCOME, PRICE, AND CONSUMPTION EFFECTS OF AGRICULTURAL PRODUCTION TECHNOLOGY


CONSUMPTION EFFECTS
PRICE EFFECTS
AGRICULTURAL PRODUCTION TECHNOLOGY
EMPLOYMENT & INCOME EFFECTS
CONSUMPTION EFFECTS
NON-TARGET GROUPS
INPUT SERVICES EMPLOYMENT
NON-FARM LABORERS
FARMERS
RURAL LABORERS
FARM EMPLOYMENT
AGRICULTURAL LABORERS
INCREASED OUTPUT
FARM FAMILIES
FARM FAMILIES
INCREASED MARKETED SUPPLIES
FARM INCOME
MARKETING & SERVICES EMPLOYMENT
NON-FARM LABORERS
URBAN POOR
FOOD PRICES
DOMESTIC SUPPLY
EXPORTS
IMPORTS
PRICE ELASTICITIES OF DEMAND INFLUENCES
INCOME ELASTICITY OF DEMAND INFLUENCES
SECONDARY INCOME & EMPLOYMENT EFFECTS

From: Goldman and Overholt, 1981:113

FIGURE 2

ALTERNATIVE MODEL OF EMPLOYMENT, INCOME, PRICE, AND CONSUMPTION EFFECTS OF TECHNOLOGICAL AGRICULTURAL DEVELOPMENT (TAD)


Technological Agricultural Development (TAD)
Consumption E
Price Effects
Employment and Income Effects
Consumption Effects
Most Frequently Applied to Cash Crops for Exports
Increases Output of Export Crops
Reduces Output of Traditional Food Crops
Increases Cost of Production
Cash Crops for Exports
Reduces Domestic Supplies of Traditional Crops
Upper and Middle Classes +
Rural Wage Earners ?
Farm Families -
Urban Poor -
Luxury Foods +
Traditional Food Prices +
Small Increases of Input Service Employmnet
Transformation of Peasants Into Wage Earners
Unemployment/ Underemployment of Peasants
Small Increases of Marketing and Services Employment
Wage Earners ?
Farm Families -
Non-Farm Laborers +
Price Elasticity of Demand Influences
Imports of Staple & Luxury Foods, Animal Feed, Agricultural Inputs
Income Elasticity of Demand Influences

of the negative effects of agricultural modernization and trade on food availability in developing nations:

> There are indications that the numbers of undernourished people in developing countries is increasing, and this may be related to the increased emphasis on large-scale production of food ... The rural poor may also be disadvantaged by a pattern of agricultural production for exports which displaces crops that had been used for local consumption. In this situation, the poor may be forced to participate in a centrally-controlled food marketing and processing system which is likely to increase the cost of a staple diet ... Therefore, the situation of the rural poor in many developing countries is one in which they subsidize the diet of the more affluent, nationally and internationally ...

In their research of export-oriented modern agribusinesses in Mexico, Rama and Vigorito (1979:243) found abrupt reductions in many of the basic crops of importance for the popular diet such as corn and wheat in all the states covered by their study (Guanajuato, Michoacan, Queretaro, Sinaloa, Veracruz and Oaxaca). The declines coincided with the introduction of fruits and vegetables for export by agribusinesses. For example, in Michoacan in 1960 there were 92,000 hectares of wheat under cultivation, by 1975 wheat acreage had been reduced to 27,000, bean cultivation went from 54,000 hectares to 31,000, and corn, the main crop of the state, was reduced from 420,000 hectares in 1965 to 338,000 ten years later. In the case of Mexico, it can be affirmed that food exports have caused a decline in the principal traditional crops (Castillo and Barajas 1986:161). In sum, there is evidence to suggest that in some regions TAD has reduced the supply of traditional crops. This has produced a price increase with a negative impact on consumption of these crops.

The employment and income effects of TAD do not seem to be as favorable as Figure 1 suggests. The alternative model represents what has been documented in many studies: that the growth of large agribusiness is rapidly transforming the agricultural labor force from self-employed peasants to wage earners, or to say if differently, from small landowners (frequently minifundistas) to proletarians (Burbach and Flynn ch. 7 and the references cited there; Barraclough 1974). The impact of this shift on nutrition could be negative, for, according to Norse (1985:25), "the link between access to land and undernutrition is well established."

Additionally, the rural labor force transformation has produced higher rates of rural unemployment/underemployment or the impoverishment of rural dwellers (see for Mexico Barkin and Suarez 1985:100; Diaz-Polanco 1981; Pare 1977; Hewitt de Alcantara 1976; for Honduras Cid 1977). Cardona (1978) has documented for Guatemala the relation between the exploitation of large landholdings for exports and rural unemployment and large seasonal rural migrations. In Central America Winson (1978) noted that export-oriented agriculture produced the demise of the aparceros from livestock haciendas, drastic reductions of permanent-wage agricultural laborers in favor of temporary workers, and increased the number of landless peasants. Frequently, agribusinesses moved by potential profits from export crops have expanded their holdings by purchasing, at times violently (Zapata 1981), small holdings or by terminating sharecropping arrangements and forcing tenants into unemployment/underemployment or wage labor. McCann (1976), a top executive of the United Fruit Company, explained in his candid account of his twenty-five years with the company, that in Central America United Fruit purchased lands from poor peasants even when the company was not considering incorporating the new land into production. This policy was used to guarantee labor supplies and to reduce the potential competition by future cooperatives. In the meantime, production of subsistence crops was reduced.

It is correct to assume, as does Figure 1, that TAD creates non-farm employment in input services, marketing and services. We have not been able to find studies which quantify the number of new jobs, but the case studies we have cited suggest that in many countries the employment balance between displacement of peasants and new jobs created by agricultural modernization is negative. In sum, in many countries modernization of agriculture is concentrating wealth in less hands, this is to say, stratifying societies which were already highly stratified.

Some new agricultural wage earners may receive higher incomes in their new jobs than what they were obtaining from their subsistence farming. However, this advantage may be counteracted by the higher prices of marketed food products which are introduced in rural areas with the shift from traditional crops and subsistence farming to modernization of cash crops for exports. Additionally, many new food products are imported, and despite the theory of comparative advantages--a point to which we will return later--by the time they reach the countryside, their prices are higher than traditional foods.

The principle of comparative advantage that promotes agricultural exports--as logical as it sounds--has also been questioned by some authors (Lappé and Collins 1977 part VII; Barkin and Suarez 1985). Leaving aside the very basic issue of political dependency that large food imports of basic staples implies for the importing countries, the argument has been made that all the foreign exchange earned by agricultural exports does not return to the country in basic foods. Instead, luxury items, industrial goods and energy which might benefit only some segment of the population (many rural areas of the Third World do not have electricity), processed foods, and agricultural inputs to be used for the production of more export crops, are among the list of products which, with basic foods, are imported. Quite frequently, in the case of foreign agribusiness and large cash crop plantations owned by nationals, the foreign exchange earned by agricultural exploitations remains overseas and never returns to the country. Potential profits from comparative advantage may be also lost by the oligopolistic nature of international trade of the most important crops.

International agricultural trade is characterized by another negative trait. Seldom are exports from Third World countries essential for the industrial nations, while food imports by the Third World tend to be so, particularly after the cultivation of traditional food crops decreases because of export crops. This means potential disruptions of their Third World agricultural economies with changes in consumers' preferences in industrial nations. It also implies that price increases will generally reduce demand because the exported food is not essential to advanced nations. As is well known, even the exportation of some non-food products for industrial use is potentially disruptive to Third World agricultural economies: some of these products are produced by perennials (rubber tree, African palm) and synthetic products could be introduced suddenly as substitutes. Furthermore, given the little political power of peasants in most countries of the Third World, trade profits do not trickle down to the laborers. What all this means is a progressive worsening of the terms of trade. For the Third World poor the comparative advantages of international trade may mean higher food prices without increases in income. In contrast, for the advanced nations it means a cheap source of agricultural labor.

Perhaps, more important than the above observations, is the questioning of the principle itself of comparative advantages. If we take the example of sugar, one of the major agricultural export crops for many Caribbean and Latin American countries, it will be difficult to prove that these countries have an advantage over the U.S. in its production. Sugar (from cane, from sugar beets, and recently from corn) can be produced as efficiently in the U.S. as in many of the countries from which the U.S. imports it. For many years sugar beet growers were paid by the U.S. government to keep their lands idle. The reasons behind the U.S. importation of sugar from the Third World are political and not economic. The beneficiaries of the sugar trade are not the consumers nor the farmers in the U.S. and even less the peasants of the Third World, but, most likely, a handful of U.S. import companies and the national elites of the sugar producing developing countries. The U.S. government is also interested in preserving sugar import quotas from Third World countries to maintain their political dependence. Undoubtedly, the economies and the governments of several countries would collapse at the moment the U.S. discontinues sugar imports from these countries. Another violation of economic principles, which makes us suspicious of the principle of comparative advantages, is the fact that sugar prices do not respond to factors of production, but to assessments by the import companies of how much U.S. consumers are willing to pay. In the early 1970s, executives of sugar import companies were prosecuted and found guilty of violating antitrust laws by colluding in price fixing. In conclusion, there is some evidence to suggest that for some agricultural products and for some countries, the principle of comparative advantage may not be grounded in economic theory, and that its application could respond to political interests of industrial nations and to economic benefits obtained by agribusiness, Third World elites and importers. That this principle may not even be applicable to international trade among socialist nations can perhaps be inferred from the study of Cuba by Benjamin et al. (1984).

Modernization of agriculture affects negatively malnutrition in other indirect ways that we can only mention in this paper. It is well known that modern agriculture is based on heavy usage of chemicals and water. Field reports have documented the frequent episodes of acute illness produced by these chemicals among the workers and their families. Given the synergetic relationship between health and nutrition, one would expect nutritional losses due to the illnesses produced by the use of chemicals. The chronic illnesses that are produced by the exposure to these chemicals throughout the years and by the drinking of chemically contaminated water in cities and in the countryside is a problem whose magnitude we will know only in the future. It has been reported in the literature that in some regions the use of large amounts of water by agribusinesses has depleted aquifers upon which small peasants depended for their crops.

THE CASE OF CENTRAL AMERICA

Several studies have pointed out the severity of malnutrition in Central America (May and McLelland 1972; Teller and Bent 1978; Sandoval 1978). INCAP (1976:2) reported that in the region there was a "permanent low intake of food among large population groups (that could be as high as 50% of the total population of the countries in Central America) a situation that can be characterized as global malnutrition." There are some signs--the evidence is not totally conclusive--that the conditions of malnutrition are not being resolved and that in some countries in Central America, protein-caloric malnutrition may be getting worse.

In Honduras the comparison of two nutrition surveys taken in 1965 and 1975 suggests that malnutrition was increasing. According to the first survey, 76% of children under five years of age had a weight/age inadequacy, the percentage increased to 85 in 1975 (CONSUPLANE, 1976:29-32). A 1976 health sector assessment by the Agency for International Development in Nicaragua (AID 1976:185) reported that "in recent studies carried out in Region 1 (Leon-Chinandega and Region 7, Puerto Cabezas), the results have demonstrated an increase in the level of severe malnutrition (grade 3) to be as high as 4.4% of the sample population. Thus, there is some indication that the nutritional status of the population has worsened rather than improved since 1966." In El Salvador, comparisons between 1965 and 1976 anthropometric measures are inconclusive about improvements in the nutritional status of the population. While there was an improvement in the height by age of the children surveyed there was a deterioration in the weight for height measurement (AID 1978:149ff). According to the summary of the report: "The principal nutritional problem in the country is the lack of calories with at least 20% of the entire population suffering marginal to severe deficiencies of calories and protein" (Ibid.:152). In Guatemala, there was no protein intake improvement between 1965 and 1975, and the caloric intake worsened substantially, in 1965 14% of the population had less than 75% of the necessary caloric intake, the number went up to 37% by 1975 (AID 1977, Anex 5, Tables 2 and 3). In Panama, nutritional improvements might have been very minimal. Infant mortality is considered a reliable indirect measurement of the nutritional status of a population and for Panama the available information suggests that there was a very small reduction of infant mortality between 1962 and 1970, it went down from 44 to 41/000, but post-neonatal infant mortality remained unchanged at 19/000 (Panama, Ministerio de Salud 1976:43 and 45). Other indications that nutrition improvements--if any--were minimal, can be inferred by the fact that between 1970 and 1973 the availability of per capita calories and proteins went down from 3000 to 2422 kcals. and from 65.8 to 60.2 gms. respectively (Sandoval 1978:209). Furthermore, for some food items, the purchasing power of workers declined (see Table 1). In Veragua, admittedly one of the poorest in the country, the 1975 levels of malnutrition were higher than the 1967 national average.

A traditional explanation for the lack of improvement in the nutritional status of a country is the worsening of the per capita food and agricultural production, this is in

TABLE 1

A LABORER'S PURCHASING POWER BASED ON MINIMUM SALARY CITY OF PANAMA, 1971(a) AND 1975(b)

Item	Amount	Working Time Required to Purchase Food (minutes)	
		Nov. 1971	April 1975
Beef loin ("falda")	1 lb.	54	76
Cow's milk (fresh)	1 lt.	30	33
Powdered milk	4 oz.	29	35
Evaporated milk	14.1/2 oz. can	28	37
Rice (med. quality)	1 lb.	14	23
Beans (average of different kinds)	1 lb.	23	46
Bread	1 lb.	23	36

a. Standing salary for the lowest classified job activity for the City of Panama 1971 = US$0.50/hours.

b. Standing salary for the lowest classified job activity for the City of Panama 1975 = US$0.55/hour.

Source: Sandoval (1978:215)

TABLE 2

PREVALENCE OF MALNUTRITION IN CHILDREN LESS THAN 5 YEARS OLD IN PANAMA

(Data derived from two studies)

Level of Malnutrition	1967 Study[a] National Average (%)	1975 Study[b] Average for Veraguas (%)
First Degree	48.8	52.4
Second Degree	10.8	21.9
Third Degree	1.1	2.6

a: Data from Evaluación nutricional de Centro América y Panama. Publicacion INCAP V-30, 1969.

b: Preliminary data from a study conducted on five districts of the province of Veraguas by the Department of Nutrition, Ministry of Health, 1975.

Source: Sandoval (1978:213)

TABLE 3

INDICES OF PER CAPITAL AGRICULTURAL AND FOOD PRODUCTION IN CENTRAL AMERICA 1960-1977

	Agricultural Production		
	1961-65	1970-73	1974-77
Costa Rica	100	119	119
El Salvador	100	93	94
Guatemala	100	110	119
Honduras	100	103	71
Nicaragua	100	104	109
Panama	100	112	124

	Food Production		
	1961-65	1970-73	1974-77
Costa Rica	100	127	131
El Salvador	100	106	109
Guatemala	100	122	133
Honduras	100	102	82
Nicaragua	100	110	113
Panama	100	116	106

Source: United States Department of Agriculture. Economic Statistics and Cooperative Services. Cited in Inter-American Development Bank (1977:12 and 13).

part attributed to the slow or negative development of the economy, generally an agricultural economy, and in part, to the rapid population growth. Rural stagnation and the population explosion--the argument explains--has an impact on per capita food supplies, prices go up and, as a result of price elasticities of demand, consumption decreases and malnutrition increases. As we have discussed earlier, the solution advanced is modernization of agricultural and international trade.

Central America economies modernized and increased international trade. Table 3 shows that between 1960-65 and 1974-77 per capita agricultural and food production increased in all countries of the region with the exception of Honduras whose food and agricultural trade of balance was also negative (see Table 4). Why, then, if there was an increase in per capita food production and large agricultural trade, were there no improvements in the nutritional status of the population, and in some countries there were obvious deteriorations? Perhaps the answer is that the paradigm presented in Figure 2 is closer to the political and economic realities than the one proposed in Figure 1. In effect, we have already mentioned studies which suggest the impoverishment of the countryside in the region during the same period (Winson 1978). Table 5 also suggests that the shift from traditional agriculture to exports was impacting negatively the consumption of beef. A possible explanation for beef consumption decreases might be that modernization of the cattle industry was not increasing production for local consumption but for exports where they could obtain higher profits. Additionally, it is possible that modernization increased cost of production and placed out of the beef market low income groups. Since it is unlikely to assume that the middle and upper classes in Central America reduced their consumption of beef (most likely they increased it) we need to conclude that the poor were the ones deprived of this important source of animal protein. This analysis can possibly be extended to other products. That the principle of comparative advantages did not work in Central America is the logical conclusion to be derived from the worsening of the nutritional status of the population.

TABLE 4

BALANCE OF TRADE IN FOOD AND AGRICULTURAL PRODUCTS CENTRAL AMERICA 1972-1976 IN MILLION OF DOLLARS

Costa Rica	1,236
El Salvador	1,602
Guatemala	8
Honduras	-145
Nicaragua	207
Panama	360

Source: FAO, Trade Year Book, 1976: vol. 30, Table 5, 1977.

TABLE 5

PRODUCTION AND CONSUMPTION OF BEEF IN CENTRAL AMERICA

	Production Thousands of Tons		Production Change %	Per Capita Consumption kg.		Consumption Change %
	1961-65 Average	1970		1961-65 Average	1970	
Costa Rica	21.4	41.1	+92	12.3	9.1	-26
El Salvador	21.0	20.0	-5	7.7	5.9	-23
Guatemala	41.0	57.4	+40	8.2	7.7	-6
Honduras	16.7	29.6	+77	5.5	5.0	-9
Panama	24.7	32.0	+30	29.9	21.8	+4
Nicaragua	32.2	56.4	+75	12.3	12.7	+3

Source: Compiled from *World Agricultural Production and Trade* (USDA 1971) cited in Berg (1973:65).

CONCLUSIONS

More than thirty years ago, Myrdal (1956:9ff cited in Caliendo 1979:137) noticed that international trade was a mechanism through which the wealthy nations became wealthier at the expense of the poor:

> Contrary to what the equilibrium theory of international trade would seem to suggest, the play of the market forces does not work towards equality in the remuneration to factors of production and, consequently, in incomes. If left to take its own course, economic development is a process of circular and cumulative causation which tends to award its favors to those who are already well endowed and even to thwart the efforts of those who happen to live in regions that are lagging behind.

It is not surprising that industrial nations have promoted international trade through their international banking and assistance agencies, and that their economists have perhaps twisted economic theory to produce principles of doubtful validity such as that of economic advantages. If we apply Myrdal's insightful observation to nutrition we could conclude by formulating the following hypothesis: international food and agricultural trade tends to award it favors to those who are already well fed in the developed and underdeveloped countries and further increases the malnutrition of the Third World underfed. The testing of the hypothesis requires a quantitative study of the nutritional trade balance: the protein and caloric value of food and non-food exports from the Third World should be measured. The potential nutritional value of non-foods such as coffee, cotton, sisal, tobacco, etc. can be measured by calculating the edible nutritional value of crops which could be produced in those lands dedicated to growing non-food crops. To obtain the nutritional balance of international trade, the protein and caloric value of imported food also needs to be measured. Likewise, the nutrition potential (additional calories and proteins) to be obtained through imports destined for the increase agricultural outputs of domestic (not export) crops (such as fertilizers) should be included in the calculation (in other words, a ton of fertilizer has a nutritional value which is equivalent to the caloric/protein value that it will add to the crop). The international nutritional trade balance sheet thus obtained, will help to clarify, perhaps more than further ideological debates, the role of international trade in the satisfaction of one of the most basic human needs. To put it differently, international agricultural trade needs to be measured also in nutritional units and not only in monetary value.

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A RESEARCH NOTE: THE ROLES OF COMMUNITY HEALTH AIDS AND ECONOMIC DEVELOPMENT IN THE NUTRITIONAL STATUS OF CHILDREN IN WESTERN JAMAICA, 1973-1984

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This note examines the roles of economic development and community health aids (CHA) in influencing changes in nutritional status of young children in Western Jamaica during 1973-1984. We will focus the analysis in Cornwall County (especially in the parishes of Hanover and St. James) since it has been the site for most of the nutrition fields studies conducted in Jamaica since 1969.

In the early 1970s, malnutrition was a major public health problem among young children in Jamaica. For example, in 1970, Gurney et al. (1972) reported that the prevalence of second and third degree malnutrition in the Gomez scale among children 0-47 months was 10.8 per cent. In addition, infant mortality rates decreased by only 13.6 per thousand during 1960-1965 and 1966-1970 (PAHO 1984). Moreover, malnutrition was the primary cause of over one-quarter of all deaths among children 2 years of age during the period 1968-1970 (Ashworth and Picou 1976). Similarly, during the same period one-quarter of hospital admissions of children under two was caused by malnutrition (Ibid.). In 1968-69 the cost of hospitalization of malnourished children was high, they occupied 8% of all hospital beds (Cook 1971). Around 1970, the mean birth weight of Jamaican children was lower than the 50th percentile of the Stuart and Stevenson Standard (Grantham-McGregor et al. 1972).

There was, therefore, an urgent need for a national nutrition programme. One of the responses was the establishment in 1973 of a CHA programme in two western parishes, namely Hanover and St. James. The programme was extended to 12 parishes in 1975, and by late 1978, 1190 CHA's were employed.

The CHAs are front line health workers with responsibility for screening and follow-up of children under five years of age who are at risk of malnutrition. The CHAs make regular home visits and are actively involved in nutrition education, growth monitoring and distribution of food supplements. They are also responsible for carrying out certain duties at the health clinic, such as weighing and charting. These health workers received two months of initial training, which continued at monthly meetings thereafter. They are supervised by public health nurses and sometimes district midwives.

The introduction of the CHA programme in Hanover resulted in a dramatic reduction in second and third degree malnutrition levels from 10.9% to 5.9% in Eastern Hanover after one year, and a similar reduction from 13% to 6.6% in Western Hanover a year later (see Table 1). Similarly, child mortality (1-48 months) also declined from 15.4 to 5.6 per 1000 in Eastern Hanover after one year (Alderman, et al. 1978). This trend continued in Western Hanover a year later with a reduction of child mortality from 13.3 to 5.7 per thousand (Ibid.). During the same period, Marchione (1977) observed in the parish of St. James also a reduction in malnutrition from 7.4% in 1973 to 4.5% in 1975 (see Table 1).

It is interesting to note that Alderman and his collaborators, and Marchione suggested different reasons for the reduction of malnutrition in the Hanover and St. James. The former attributed the nutritional improvement in Hanover--a parish which had not experienced economic

TABLE 1

TRENDS IN MALNUTRITION LEVELS (GOMEZ CLASSIFICATION) DURING 1973-1984, HANOVER AND ST. JAMES

	HANOVER			ST. JAMES		
	Gomez II & III			Gomez II & III		
YEAR	%	(N)		%	(N)	
1973	10.9+	(1879)	a	7.4	(486)	e
1974	5.9+	N.A.	a	N.A		
	13.0++	(3200)	a			
1975	6.2+	N.A.	a	4.5	(490)	e
	6.6++	N.A.	a			
1976	5.8	(1729)	b	N.A		
1978	6.5	(92)	c	9.3	(161)	c
1982	5.4	(5731)	d	8.3	(290)	f
1984	5.0	(6134)	d	10.2	(773)	g

+	East Hanover
++	West Hanover
N.A.	Not Available
a	(Alderman et al. 1978)
b	(Thompson 1977)
c	(CFNI 1979)
d	(Ministry of Helath, Jamaica 1980-1984)
e	(Marchione 1977)
f	(McLeod 1985)
g	(Melville et al 1984)

improvement--to the impact of the CHA programme. Marchione felt that the nutritional improvements in St. James were due to self-reliant development, especially among subsistent farmers. Melville (1986) compared the CHA programmes in St. James and in Hanover and reported the lack of success in the first as compared to the other, and attributed the differences to the following factors: St. James did not have the input of the Cornell Medical Team as did Hanover, the ratio of CHA to population (1:390 in Hanover compared to 1:837 in St. James), the lack of extensive out reach in St. James, and shortcomings in a continuous supply of food supplements in St. James as compare to the Hanover programme. In addition, the distribution of the CHAs in St. James was strongly influenced by politics, resulting in their uneven deployment.

During the 1976-78 and in the early 1980's malnutrition remained constant at 6% in Hanover (Caribbean Food and Nutrition Institute 1979; Thompson 1977; Ministry of Health 1980-1984). On the other hand, malnutrition levels increased from 4.5% to 9.3% in St.James during the period 1975-1979 (CNFI 1979), remained unchanged at 8% in 1982 (McLeod 1985) and increased again to 10.2% by 1984 (Melville et al. 1984). Moreover, the other three parishes (Trelawny, Westmoreland and St. Elizabeth) did not show any significant reduction in malnutrition levels during the period 1978-1984 (CNFI 1979; Melville et al. 1984).

Marchione (1984) suggested that despite significant improvements in the health care delivery during the 1970s as a result of the CHA programme, economic changes seemed to be the major factor influencing the nutritional status of young children. Economic conditions improved during 1973-75 in most parishes (excluding Hanover) in Jamaica and, thereafter, they deteriorated. In fact, during 1977, food prices increased by 40% due to policies imposed by the International Monetary Fund (Lappe et al. 1981). During the early 1980s there was a substantial devaluation of the Jamaican dollar from US 1.78 in 1982 to 4.95. As a result, the consumer price increase escalated greatly, causing the price of basic food stuff such as flour, rice and cornmeal to increase dramatically during 1982-84. Most probably, the standard of living among the low income groups was seriously eroded.

However, it should be noted that despite these economic changes, Hanover has been able to maintain the low levels of malnutrition achieved during the early 1970s. This is a significant achievement and shows that well organized community health projects can make a difference. Moreover, these findings support the hypothesis that there is a nutritional threshold above which no further nutritional benefits can accrue to the community from the work of the CHAs (Kielmann et al. 1980). Any further reduction in malnutrition may have to be stimulated by economic development that is focused on the needy. We were unable to examine infant mortality rates during the period 1976-84 because of the very high percentage of infant deaths that were not registered (Desai et al. 1983).

CONCLUSIONS

It is quite evident, from the case of Hanover, that community nutrition programmes integrated into primary care can be successful in alleviating malnutrition among young children even in the absence of economic growth. Widespread coverage, regular home visits, growth monitoring, nutrition education and supplementation appear to be key factors that influence the success of these programmes. This finding should not exclude efforts to develop strategies aimed at meeting the basic needs of the poor, in fact they should be fully integrated into primary health and nutrition programmes. The interferences of politics on community oriented health programmes are very negative. This was quite evident in the recruitment and development of CHAs in St. James. In conclusion, it should be emphasized that the use of appropriate technology in primary health care programmes, such as CHAs, may have far reaching implications for national nutrition in developing countries.

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CASE STUDIES

ENVIRONMENTAL SANITATION AND INFANT MORTALITY: A STUDY OF RELATIONSHIPS IN ILE-IFE, NIGERIA

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INTRODUCTION

The present paper examines the influence of some variables of the environment, notably, water, toilet and refuse disposal facilities, on infant mortality in Ile-Ife, Nigeria. This analysis is built upon the belief that environmental factors still play an important part in determining the likelihood of infant survival in developing countries, the importation of medical technology notwithstanding. In fact, while the effectiveness of medical programs may be enhanced by environments that are clean and which have good quality water supplies, filthy environments that lack basic social amenities may reduce the effectiveness of medical programs on mortality rates.

The phenomenal growth in the study of infant mortality could have been partially generated by the fact that infant mortality rates,noted to be sensitive to socioeconomic and environmental conditions, are usually regarded not only as indices of socioeconomic differentials, but also as sensitive indicators of the availability and effectiveness of the types of medical and social services programs in a society. At the aggregate level, higher rates are usually reported for less developed than for more developed regions. At the individual level, the probability of infant death is associated with the social and economic class of parents, among other variables.

Declines in infant mortality have usually been regarded as a major component of the demographic transition in both more developed and less developed regions of the world (Frenzen and Hogan 1982). However, while declines in general mortality levels have been traditionally related to industrialization and economic development, mortality declines in less developed regions are often associated with the rise and importation of modern medical technology. In many more developed countries, growth in real per capita income, improvements in agricultural and distributional technology, improved sanitary conditions and increased educational attainment usually precede or are accompanied by remarkable declines in mortality. In fact, McKeown attributed the health improvements in Europe in the 18th century to improvements in public health sanitation systems and improved agricultural techniques rather than to any medical improvements. The development of the smallpox vaccine was the only medical intervention that was seen to have had any appreciable effect on the death rate. Unlike the experiences in many more developed countries, many less developed countries have achieved comparable mortality declines without much economic development.

The quality of the environment in which an individual lives (usually reflected by the level of cleanliness and the availability of functioning social amenities) could also be an indicator of socioeconomic differentials which can translate into mortality differentials. At the sectoral level, the urban areas of developing countries are noted to have more social amenities than the rural areas. Within each urban area, residential zones of different qualities are to be found. While some residential areas may be over populated with little or no social infrastructures, others may be averagely populated with all the basic social amenities. And within the same residential zone some residential buildings might be well equipped with modern kitchen, toilet and waste disposal facilities while others are lacking some or all of these facilities. Differentials in the availability of these social amenities signify the different environmental settings in which infants are being reared.

Using data on births and deaths and applying the Ordinary Least Squares Regression technique, an investigation of the impact of environmental variables on infant mortality is undertaken. The present analysis demonstrates that certain toilet and water facilities, observed in earlier studies to enhance infant survival chances, appear to enhance infant deaths once the effects of other parental factors are controlled.

The next six sections of the paper present the theoretical framework, the research setting, the data, the specification and estimation of the model, a discussion of findings and summary and conclusion, in that order.

THEORETICAL FRAMEWORK

The impact of sanitary conditions on the health of the people has been well documented. As earlier noted, improvements in health in the presently more developed nations of the world have been largely credited to improved sanitary conditions (Mckeown 1965). In many of the presently less developed countries, an association has been established between the level of infant and child mortality and the post natal environmental conditions indexed, among others, by the quality of water supply, the types of toilet facilities, and the nature of refuse disposal systems. It is established, for instance, that poor water and toilet sanitation are positively correlated with infant deaths (Gordon et al. 1964; Barrel and Rowland, 1979).

The need for good quality water in an environment where an infant is being nursed becomes appreciated if it is realized that an infant cannot be adequately fed on breast milk alone for a long period of time without food supplements that are normally prepared by water. In the absence of adequate water and modern sanitation facilities, water used in preparing the food supplements may be contaminated. Deterioration in water quality as a result of fecal contamination is imminent in less developed countries with environments that are characterized by open gutters, dung hills, indiscriminate animal and human defecation as well as unorganized fecal disposal. During rain, water collected for use or that in open wells is filled with fecal and other dirty sediments. Such feces-contaminated water is usually associated with high incidence of diseases such as diarrhea, cholera, typhoid, dysentery, and hepatitis that constitute sources of infant deaths in developing countries (Gordon et al. 1964; Khan et al. 1981). Lack of water, which is believed to encourage the development of poor sanitary habits, produces the same effect as the availability of poor quality water (Stein 1977).

The established association between feces-contaminated water and child morbidity tends to imply that the provision of modern sanitary facilities, because of the potentiality to enhance the hygienic conditions of the home and of the surroundings, could facilitate a reduction in the incidence of child morbidity and death. While this implication might not be unrealistic, it is important to realize that adequate sanitary facilities tend to produce desired effects only if they are put into proper use (Gordon et al. 1964) and only if the total environments are themselves clean. It might be deduced, therefore, that improper use of sanitary facilities is responsible for little or no reduction in child morbidity and mortality after better waste disposal facilities and improved quality water have been made available in some locales (Scrimshaw et al. 1968; Levine et al. 1976; Curlin et al. 1977). With such a deduction, sanitary facilities per se only tend to aid in the maintenance of sanitary conditions, but do not serve as a perfect index of the true level of household sanitation (Stephens 1984).

In addition to the sanitation facilities available there might be the need to take into consideration the quality of usage of those facilities. Maternal education, on the assumption that higher educated mothers tend to make better use of sanitary facilities than their less educated counterparts, has in many works been used as an index of the quality of usage. In that respect, the quality of usage can be accounted for in either of two ways. First, maternal education can simply be included as a control variable in the equation that relates sanitation facilities to infant mortality. Second, as Stephens (1984) notes, an index that combines the quality of use of sanitation facilities with the type of sanitation facilities available may be created; this index is assumed to provide a better measure of the level of household sanitation. Both approaches are adopted in this study.

Besides the availability and quality of use of water and toilet facilities, other variables of environmental sanitation examined in this study include types of refuse disposal systems and the kitchen facilities available. Inadequate disposal of refuse or a pile up of refuse may, on decay, cause air pollution, which may constitute health hazards not only to the infants, but also to the adults in the environment. The presence of air pollution has been found to have a bearing on the health of infants and children; an increased frequency and severity of lower respiratory tract infections has been associated with prolonged exposure to polluted air (Douglas and Waller 1966). Cookers that produce a lot of smoke when burning could also be hazardous to the health of infants and adults. Besides polluting the air, the smoke from such cookers could cause a choking atmosphere in the house. An inhalation of such gaseous elements by the infants could produce adverse effects of their health.

Some other characteristics of the parents are also accounted for in the examination of the relationship between environmental factors and infant mortality. These characteristics include maternal occupation, age, and paternal income. Occupational differentials, probably because they reflect differences in income, prestige and access to medical care, in addition to differences in available time for child care, have been found to interpret differentials in infant survival (Antonovsky and Berstein 1977; Carvajal and Burgess 1978). Similarly, since income differentials could interpret to differentials in infant mortality through a host of factors, they have been accounted for in this study.

RESEARCH SETTING

Ife-Ife is one of the oldest towns in southwest Nigeria, located about 80 kilometers northeast of the Oyo state capital, Ibadan, and about 230 kilometers northeast of Lagos, Nigeria's capital city. Ife-Ife is famous not only for its historical reputation as the cradle of the Yoruba race, but also as the center of an ancient civilization and the home of the renowned Ife museum. The 1963 census gave Ife's population as 130,000.

The town is presently divided into six wards: Iremo, More, Ilare, Ilode, Okerewe and Modakeke. The continuing demand for autonomy by Modakeke has led to a series of strifes that have not only led to the loss of several lives, but have also affected the stability of the population.

Ife is primarily a commercial and an educational center. It is, by no means , an industrial center. There are a few medium-sized departmental stores and several small-scale retail stores in the town. In addition to the retail stores and traders, there are several farmers, production workers and a few service workers in the town. Educationally, Ife consists of a few primary and secondary schools, a technical school, a teacher training college, a College of Arts and Sciences, and a university, the University of Ife. In addition to attracting students from all parts of the country, these institutions of learning provide employment for various categories of workers, notably administrative, clerical, secretarial and academic.

In addition to the University of Ife health center, mainly established to attend to the medical needs of its students, the members of staff and their dependents, two hospitals under the University of Ife Teaching Hospitals Complex -- The Seventh Day Adventist Hospital and the Ife State Hospital -- provide health care services to the inhabitants of Ife. The services of these hospitals and those of the University health center are supplemented by those of a few private hospitals, clinics and two established maternity centers. While the private hospitals and clinics provide all kinds of services to their patients, the maternity centers specialize in providing ante and post natal care services to mothers.

THE DATA

This analysis is based on data on births and infant deaths collected through a two-part questionnaire administered in follow-up home visits in Ile-Ife, Nigeria. The births and infant deaths are those that occurred in 1980 and 1981 among three groups of mothers. The three groups are: 1) mothers who received ante natal care and delivered in either one of two maternity centers (Enuwa and Modakeke) or State Hospital, Ife; 2) mothers who received ante natal care in any of the health establishments but failed to deliver in any of them; and 3) mothers who did not receive ante natal care and delivered at home.

The records of the two maternity centers and of the State Hospital were used to determine the names and addresses of women in the town who received ante natal care and either did or did not deliver in these establishments. From hospital and maternity centers' records, 1,000 mothers who received ante natal care and delivered in these health institutions in 1980, and 1,000 mothers who did not deliver in the centers but who, by their ante natal care records, must have delivered at home in 1980, were selected. Having randomly selected the mothers from all mothers in each category, the services of the community health nurses were employed to trace and interview them.

Consequent upon the internal rifts between the Modakeke segment of the town and the rest of Ife, a considerable out-migration of the population was experienced; hence, it became impossible to obtain more than half of the desired sample size for each of the two groups of women, using the 1980 records only. It therefore became imperative, in order to achieve a larger sample size, to extend our interview to randomly chosen mothers who had births in 1981. The addition of the 1981 records led to a considerable improvement in the sample size even though the target of 1,000 each of the two groups was still unattainable. Of the over 1,000 selected mothers who delivered in the hospital and the maternity centers, 634 mothers were traceable, and of the over 1,000 mothers selected among those who had ante natal care but did not deliver in any of the establishments, 839 were located.

Women who neither received ante natal care nor delivered in any of the establishments were located through a two-stage sampling procedure. First, community nurses who lived in different parts of Ife were asked to conduct household interviews in selected neighborhoods similar in socioeconomic characteristics to those from which the maternity centers and hospital clientele came to determine those who gave birth in 1980. A list of such mothers was compiled. A sample of 1,000 mothers that would be paid follow-up visits was drawn from the list through a random selection procedure. Also resulting from internal disturbances, some of the mothers left Ife before they could be reached. It then became desirable, in order to achieve a fair sample size, to extend the survey to mothers who had their deliveries in 1981. Despite the exercise, only 638 of such mothers were successfully interviewed.

The first part of the questionnaire deals with the socioeconomic and cultural characteristics of the mother and of their households. Information was sought on the reproductive history of mothers, the socioeconomic and cultural characteristics of mothers and of other family members (e.g., income, education, type of economic activity and religion, among others), environmental factors (such as sources of water supply, waste disposal facilities), and the nutritional habits of mothers before and after weaning. The second part concentrates on the infant. For instance, questions were asked on the sex, date of birth delivery condition, immunization, health history, feeding habits, weight at birth and cause of death (if dead at the time of the survey).

METHODOLOGY

The ordinary least squares regression model has been employed to examine the relationship between infant mortality and environmental variables. In the estimation of the parameters of some of the equations that examine how differentials in environmental conditions could interpret to differentials in infant mortality, other attributes of the mother (age, education and occupation) and those of the father (education and income) were controlled.

In all, four sets of equations were estimated. The first equation relates infant mortality to all selected variables of the environment without taking into account other attributes of the parents. The second equation controls some other parental attributes; thus we are afforded an opportunity to determine if the pattern of association earlier observed between infant mortality and environmental factors change on controlling other parental attributes. The third and fourth equations concentrate on the impact on infant mortality of toilet and water sanitation, respectively. While equation three relates infant mortality to quality of toilet sanitation (the interaction of types of toilet facilities and maternal education), equation four examines the relationship between infant mortality and the quality of water sanitation (the interaction of maternal education and types of water facilities). In both equations, other variables of the environment as well as other parental attributes are controlled.

The independent variables are dummy variables which assume the values one or zero. The general equation of the probability of infant death is specified as:

$$Dij = a_o + \overset{p}{i = 1} \quad \overset{g - 1}{j = 1} bj \times ji + \quad ij$$

were Dij = the probability of infant death among women in group j of variable i;

= intercept (constant term)

bj = regression coefficients
Xji - the jth category of independent variable i; i = 1, 2, ..., p (and p varies among the four equations estimated).

j = 1, 2, ..., g - 1 (g is the number of categories of each independent variable).
ij = error term.

Since a constant term is included in each equation, dummies corresponding to every level of an independent variable were not included in the equations since doing so would cause the moment matrix to be singular and the normal equation would accordingly have no unique solution. One category each of the binary variable groupings has therefore been omitted in the estimation of the parameters of the equations.

Estimates of the parameters of the equations are presented in Tables 1 to 4. The intercept is the standard case defined by women in the excluded category for each factor. The b coefficients then represent the differences between the probabilities of infant death among mothers at designated levels of the factors and those of the excluded levels. B- coefficients that are significantly different from zero according to a two-tailed test with a level of significance of .05 are asterisked. The excluded categories are depicted as R.C. (Reference Category) on the tables.

Results

Table 1 shows the Ordinary Least Squares Estimates of the probabilities of infant death according to the selected variables of the environment. Estimates in Panel 1 show

TABLE 1

Ordinary Least Squares Estimates of the Probability of Infant Death

Coefficients of:

1.	Source of Water Supply:	
	Piped Water	0.03979
	Well	0.04617
	Stream	R. C.
2.	Location of Source of Water Supply:	
	Inside of Dwelling House	-0.00082
	Outside of the Dwelling House	R.C.
3.	Toilet Facilities:	
	Bush	0.01669
	Pit Latrine	0.01217
	Pan (pail carrying system)	-0.02357
	Flush	R.C.
4.	Refuse Disposal System:	
	Burned	0.01268
	Incinerated	-0.01168
	Dumped in Open Gutter	*0.07833
	Kept in Dustbin for Refuse Collectors	R.C.
5.	Cooker Facilities:	
	Firewood	-0.01039
	Kerosene Stove	*-0.08047
	Gas Cooker (stove)	-0.04926
	Electric Cooker/Other**	R.C.
6.	Number of Rooms Occupied by Family:	
	One	*0.05372
	Two	0.04029
	Three	0.01267
	Four and Above	R.C.

Table 1

Table 1 (Cont'd.)

7. Possession of Refrigerator:	
Yes	-0.02287
No	R.C.
INTERCEPT	0.03437
R-SQUARE	0.04152

R.C. stands for Reference Category
*Significant at the 5% level
**Majority of mothers in the "Electric Cooker/Other" category either combine the use of electric cooker with other cooker facilities or use a combination of other cooker facilities.

how infant mortality relate to sources of water supply. Contrary to some earlier findings (Butz et al. 1982; Stephens 1984), infants born to households with piped water experience higher mortality than did infants in households with streams as their source of water. Infants born to households using wells experience the highest rate of mortality. The findings raise a fundamental issue -- it is not the mere laying of pipes in the households, but the regular supply of drinkable (chlorinated) water through them that is relevant to the health of the people. In Ife, as in many towns in Nigeria, effective water supplies through the pipes has been lacking. There are usually days without piped water, and the water is sometimes polluted probably because of leakages in the pipes.

In relation to that associated with the use of stream water, the higher infant mortality associated with the use of piped water could be attributed to either, or both, of two factors: 1) water coming through the pipes is sometimes polluted and since mothers who use it believe that it is pure, the water is not usually treated before use; 2) households that depend mainly on piped water are forced to use other sources of water they are not used to during shortage of piped water. This situation could enhance morbidity among infants who get fed with different quality water supplies. With respect to wells, several of them are dug in unhygienic environments (especially, in areas close to suck-aways or pit latrines) and are not properly treated before use. During rains, water in some wells is filled with fecal and other contaminants and since the water may not be treated before use, it poses a threat to the health of the infants, thus explaining the relatively high infant mortality associated with the use of well water. Unlike wells, contaminants in streams are diluted through flow. In addition, households depending on stream water are probably conscious through several campaign programs of the uncleanliness of water drawn from the streams; hence, stream water may be treated before use. That may explain the lower infant mortality associated with the use of either well or piped water. The locational advantage of having the source of water supply inside the dwelling house is negligible (see panel 2).

Estimates in panel 3 of Table 1 depict that the probabilities of infant death according to the different toilet types do not vary significantly at the 5 percent level. However, the higher probability of infant deaths associated with the use of flush toilet when compared with that associated with the use of the less hygienic pan toilet deserves a comment. The irregular supply of piped water into households using flush toilets (which are located inside the home) could lead to an accumulation of human wastes in water closets; such accumulation of human waste tends to become a health hazard, either because it pollutes the air or because human waste might be spread by flies. Contrary to some earlier findings (see for example, Iwugo 1981), households using pan toilets experience the least probability of infant death. Users of pan toilets might have evolved over time ways of preventing the major sources of health hazards, which are the excessive contamination of seats and the spread by flies of human waste disposed in buckets. The adverse effects of pit latrines on the health of the infants may be through the contamination of well water. By a possible pollution of air and the spread of human waste by flies, the disposal of human waste in bushes has the greatest adverse effect on the survival of infants.

The pattern of association between the probability of infant death and the various refuse disposal systems is depicted by the estimates in panel 4 of Table 1. Except for "dumping of refuse in open gutter," the estimates show no remarkable variations in the probabilities of infant mortality across the different refuse disposal systems. While the use of incinerators is associated with the least probability of infant deaths, dumping of refuse in open gutters constitutes the greatest health hazard to the infants. Dumping of refuse in troughs generally inhibits a free flow of water, thus leading to the formation of stagnant waters that are breeding places for various breeds of mosquitoes. Malaria fever, one of the major causes of infant deaths in tropical regions, is associated with mosquito bites. That the use of dustbins poses greater (though not significant) health hazards to the infants than the use of incinerators may be attributed to irregular collection of refuse that is kept in dustbins outside the house by the authorities concerned. Refuse kept in dustbins for a long period of time may decay and air pollution resulting from decayed refuse may be hazardous to the health of the infants (see for example, Douglas and Waller 1966). The use of incinerators, even though it involves burning, does not generally lead to much air pollution.

The effects on infant deaths of the use of different cooker facilities in households were examined on the expectation that the amount of smoke produced by a cooker facility, and by implication the amount of air pollution arising from its use, would be positively related to the degree of health hazards its use poses. In that respect, the use of either firewood or kerosene stoves is expected to constitute greater health hazard to the infants than the use of either the gas cooker or electric cooker that affords a cleaner environment. However, a different pattern emerges from the estimates displayed in panel 5 of Table 1. The use of kerosene stoves is associated with the highest probability of infant survival and the use of electric cookers and others is associated with the least probability of infant survival.

The comparatively lower probability of infant deaths associated with the use of kerosene stove could be attributed to a steady supply of kerosene and the mothers' high adaptation to the use of kerosene stoves; such adaptation results from many years of use. Unlike kerosene, the supply of either electricity or domestic gas was not regular at the time of the survey. Thus, mothers depending solely on either electric cookers or gas stoves had to use the other cooker facilities with which they might not be very familiar during power cuts or gas shortages, respectively. Improper usage of any of the other cooker facilities might create situations that have adverse effects on the health of the infants. Compared to the probabilities of infant death associated with the use of either the kerosene stove or gas cooker, the higher probability of infant death associated with the use of firewood could be attributed to the unhygienic conditions arising from the use of firewood in the house.

Although the size of the family was not controlled in the equation, panel 6 of Table 1 shows a monotonic decline in the probabilities of infant mortality as the number of rooms occupied by a family increases. Even though house density was employed in one of the earlier studies (Butz et al. 1982), and even though the size of the family was not controlled, it is believed that the possibility of crowding decreases as the number of rooms occupied by a family increases. Crowding is known to have adverse effects on health and survival through increased contagion of respiratory diseases (Gorosomov 1968) and through increased contact and fomite transfer of orally ingested pathogens (Butz et al. 1982).

It is generally presumed that the availability of refrigerators in the households could be an asset, since refrigerators facilitate the storage of food items for a long time without their becoming spoiled or contaminated. Mothers who keep their babies' liquid foods in refrigerators are therefore assumed to have a better assurance of uncontaminated foods than mothers who do not. It is therefore not surprising to note that mothers in households with refrigerators experience lower probability for infant death than mothers in households without them (see panel 7 of Table 1).

An examination of Table 2 reveals that the patterns of association observed between the probabilities of infant death and each of the variables were not altered when some parental attributes were controlled. Besides confirming the patterns of association earlier observed in Table 1, Table 2 shows the relationship between infant deaths and some parental factors.

Although the parental factors are merely included in the equation in order to have "pure" effects of the variables of the environment, we briefly discuss their relationship to infant mortality. In panel 8 of Table 2, it is demonstrated that the probabilities of infant death decrease with mother's age. Older mothers tend to be more experienced in child care activities than their younger counterparts. In addition, the probability of infant death is usually higher among first births experienced by the very young mothers. These two factors might have contributed to the higher rates of infant death among the younger mothers.

Unlike some earlier findings (Antonovsky and Berstein 1977; Carvajal and Burgess 1978; Caldwell 1979; Butz et al. 1982; Stephens 1984), which show an inverse association between maternal education and infant/child mortality, the present study shows that more educated mothers experience higher rates of infant mortality than the lower educated mothers. It is possible that higher educated mothers are

TABLE 2

Ordinary Least Squares Regression Results Relating Environmental Factors and Some Maternal Attributes to Infant Mortality

Coefficients of:	
1. Source of Water Supply:	
Piped Water	0.03210
Well	0.03923
Stream	R.C.
2. Location of Source of Water Supply:	
Inside of Dwelling House	0.00011
Outside of the Dwelling House	R.C.
3. Toilet Facilities:	
Bush	0.00073
Pit Latrine	-0.00456
Pan (pail carrying system)	-0.04047
Flush	R.C.
4. Refuse Disposal System:	
Burned	0.01947
Incinerated	-0.01106
Dumped	*0.00051
Kept in Dustbin for Refuse Collectors	R.C.
5. Cooker Facilities	
Firewood	-0.01325
Kerosene Stove	*-0.00098
Gas Cooker (stove)	-0.04202
Electric Cooker/Other	R.C.
6. Number of Rooms Occupied by Family	
One	0.02080
Two	0.02457
Three	0.00600
Four and Above	R.C.
7. Possession of Refrigerator:	
Yes	-0.02220
No	R.C.

Table 2 (Cont'd.)

8.	Age of Mother:	
	15 - 19	*0.13636
	20 - 24	0.05703
	25 - 29	0.02907
	30 - 34	0.00423
	35 - 39	0.00785
	40 and Above	R.C.
9.	Education of Mother:	
	No Schooling/Primary Uncompleted	-0.05243
	Primary Completed/Secondary Uncompleted	0.07533
	Secondary Completed	R.C.
	Post-Secondary (professional and degree)	0.01842
10.	Income of Father:	
	Below N2,000	0.02844
	Between N2,000 and N4,000	-0.00463
	N4,000 and Above	-0.01310
	Unknown	R.C.
11.	Occupation of Mother:	
	Professional, Technical, Administrative	0.02329
	Clerical	*0.03615
	Sales	0.03542
	Farming	0.11708
	Transport, Crafts	0.04486
	Not Working	R.C.
	INTERCEPT	0.05984
	R-SQUARE	0.05693

R.C. stands for Reference Category
*Significant at the 5% level

engaged in more time consuming occupations that compete with childbearing for their time. Mothers in such occupations, in order to retain and attend to their jobs, are usually forced to employ relatively cheaper housemaids, some of whom are not capable of offering the infants the type of care they need at their tender age. This line of reasoning appears to be corroborated by the estimates in panel 11 of Table 2. Except for the few mothers in professional and administrative occupations, non-working mothers experience lower rates of infant mortality than mothers who are engaged in such comparatively demanding occupations as clerkship or transport and crafts that are usually assumed by comparatively higher educated individuals.

The father's income, rather than his occupation, has been controlled in equation 2. Occupational differences are presumed to interpret to differences in infant mortality through differences in incomes associated with such occupational differences. The estimates shown in panel 10 of Table 2 depict a negative association between father's income and the probabilities of infant death.

Panel 1 of Table 3 shows the estimates of the quality of toilet sanitation (the interaction of maternal education and the types of toilet facilities). The other panels show estimates of other variables accounted for in the equation and for these other variables, the patterns of association observed between them and infant mortality in earlier equations are maintained. In order to avoid having empty cells, education and toilet facilities have each been reduced to three levels. On the basis of the frequency distributions, pit and pan toilets that have some characteristics in common were grouped together. Also, since Table 2 shows no remarkable difference between the effects of secondary and post-secondary education on the probability of infant death, the two educational categories were combined.

Three features are notable in panel 1 of Table 3. First, contrary to an earlier finding (Stephens 1984), lower educated mothers appear to be better users of all the toilet facilities if quality of use is assumed to be reflected by the probabilities of infant death. Again, the fact that higher educated mothers usually employ mother surrogates to cater for their children may account for this pattern. Two, except for secondary and post-secondary educated mothers,

TABLE 3

OLS Regression Results Relating Quality of Toilet Sanitation, and Other Factors to Infant Mortality

Coefficients of:

1. Quality of Toilet Sanitation:	
No Education/Bush	-0.04803
No Education/Pit-Pan	-0.05120
No Education/Water (flush)	-0.03011
Primary/Bush	-0.06053
Primary/Pit-Pan	-0.07288
Primary/Water (flush)	-0.06698
Secondary-Post Secondary/Bush	0.00887
Secondary-Post Secondary/Pit-Pan	0.00455
Secondary-Post Secondary/Water (flush)	R.C.
2. Source of Water Supply:	
Piped Water	0.03131
Well	0.03827
Stream	R.C.
3. Refuse Disposal System:	
Burned	0.01990
Incinerated	-0.01154
Dumped in Open Gutter	*0.08171
Kept in Dustbin for Refuse Collectors	R.C.
4. Cooker Facilities:	
Firewood	-0.01432
Kerosene Stove	-0.08234
Gas Cooker (stove)	-0.04310
Electric Cooker/Other	R.C.
5. Number of Rooms Occupied by Family:	
One	0.02795
Two	0.02523
Three	0.00626
Four and Above	R.C.
6. Location of Source of Water Supply:	
Inside the Dwelling House	0.00115
Outside of the Dwelling House	R.C.

Table 3 (Cont'd.)

7.	Possession of Refrigerator:	
	Yes	-0.02200
	No	R.C.
8.	Age of Mother:	
	15 - 19	*0.13280
	20 - 24	0.05372
	25 - 29	0.02727
	30 - 34	0.01538
	35 - 39	0.00656
	40 and Above	R.C.
9.	Income of Father:	
	Below N2,000	0.02537
	Between N2,000 and N4,000	-0.00588
	N4,000 and Above	-0.01260
	Unknown	R.C.
10.	Occupation of Mother:	
	Professional/Technical/Administrative	-0.02600
	Clerical	0.03786
	Sales	*0.03515
	Farming	0.11357
	Transport, Crafts	0.04504
	Not Working	R.C.
11.	Education of Mother:	
	No Schooling/Primary Uncompleted	-0.01065
	Primary/Secondary Uncompleted	-0.01486
	Secondary	R.C.
	Post-Secondary	-0.01771
12.	Ante Natal Registration Status and Place of Delivery:	
	Registered and Delivered in the Clinic	-0.00508
	Registered and Delivered at Home	0.00999
	Did not Register and Delivered at Home	R.C.
	INTERCEPT	0.06582
	R-SQUARE	0.05737

R.C. Stands for Reference Category
*Significant at the 5% level

the use of pan toilets still has the least negative impact on infant survival. Three, with each educational group, there appears to be not significant difference in the impact on infant mortality of the use of the different toilet facilities. Table 3 also shows, in panel 12, that the least probability of infant death is recorded among women who had ante natal care and delivered in one of the health institutions.

The estimates of the quality of water sanitation are presented in panel 1 of Table 4. Estimates of variables accounted for in the equation relating water sanitation to infant mortality are displayed in the other panels.

The estimates in panel 1 of Table 4 depict certain features. One, education as an index of the quality of water sanitation is affirmed (and, in fact, weakly) only if a comparison is drawn among the coefficients of the use of stream water across the three educational groups; for other sources of water, the lower educated mothers tend to have a comparative usage advantage over the higher educated groups if quality of usage is related to the impact of the use of each water source on infant mortality as reflected by the estimates. Two, except for the primary educated mothers, the use of well water continues to exert the greatest negative impact on infant survival. As earlier pointed out, the estimates might not reflect the impact of usage habits of the educated mothers themselves, but the effects of usage habits of the educated mothers' housemaids.

SUMMARY AND CONCLUSION

An examination of the relationship between infant mortality and some variables of the environment in Ile-Ife, Nigeria, was carried out in the preceding analysis. Contrary to earlier findings, the analysis demonstrates, among others, that certain toilet and water facilities which are expected to increase child survival chances appear to enhance infant deaths once the effects of other parental attributes are controlled. For instance, it was discovered that mothers who depend solely on either piped water or flush toilets experience higher probabilities of infant death than mothers who respectively depend on either stream water or pan toilets. Also contrary to expectation, cooker facilities that usually emit much smoke when burning and by implication

Table 4

TABLE 4

OLS Regression Result Relating Quality of Water Sanitation, and Other Factors to Infant Mortality

Coefficients of:

1. Quality of Water Sanitation:	
No Education/Piped Water	0.01836
No Education/Well	0.02284
No Education/Stream	0.00024
Primary/Piped Water	0.00117
Primary/Well	-0.00012
Primary/Stream	0.12472
Secondary-Post Secondary/Piped Water	0.06389
Secondary-Post Secondary/Well	0.13639
Secondary-Post Secondary/Stream	R.C.
2. Toilet Facilities:	
Bush	-0.00327
Pit Latrine	-0.00595
Pan (pail carrying system)	-0.04393
Flush	R.C.
3. Refuse Disposal System:	
Burned	0.01960
Incinerated	-0.01193
Dumped in Open Gutter	*0.08188
Kept in Dustbin for Refuse Collectors	R.C.
4. Cooker Facilities:	
Firewood	-0.01656
Kerosene Stove	*-0.08397
Gas Cooker (stove)	-0.04493
Electric Cooker/Other	R.C.
5. Number of Rooms Occupied by Family:	
One	0.02994
Two	0.02665
Three	0.00676
Four and Above	R.C.
6. Location of Source of Water Supply:	
Inside Dwelling House	0.00235
Outside of the Dwelling House	R.C.

Table 4

Table 4 (Cont'd.)

7.	Possession of Refrigerator	
	Yes	-0.02253
	No.	R.C.
8.	Age of Mother:	
	15 - 19	*0.13342
	20 - 24	0.05374
	25 - 29	0.02572
	30 - 34	0.01631
	35 - 39	0.00592
	40 and Above	R.C.
9.	Income of Husband:	
	Below N2,000	0.02517
	Between N2,000 and N4,000	-0.00671
	N4,000 and Above	-0.01144
	Unknown	R.C.
10.	Occupation of Mother:	
	Professional/Technical/Administrative	-0.02617
	Clerical	0.03583
	Sales	*0.03644
	Farming	0.11964
	Transport, Crafts	0.04480
	Not Working	R.C.
11.	Education of Mother:	
	No Schooling/Primary Uncompleted	0.01408
	Primary/Secondary Uncompleted	-0.01663
	Secondary	R.C.
	Post-Secondary	-0.02065
12.	Ante Natal Registration Status and Place of Delivery:	
	Registered and Delivered in the Clinic	-0.00557
	Registered and Delivered at Home	0.01014
	Did not Register and Delivered at Home	R.C.
	INTERCEPT	0.03683
	R-SQUARE	0.05893

R.C. Stands for Reference Category

constitute great health hazards are found to have lesser negative impact on child survival than the almost smokeless cookers. With reference to refuse disposal systems, dumping of refuse in open gutter constitutes the greatest health hazard and if a distinction is broadly made between pre-secondary and post-primary educated mothers, education appears to have a negative relationship with infant survival.

The patterns of association between infant mortality and variables of the environment raise some fundamental issues. First, there is the need to provide social amenities that are functional if we expect socioeconomic development to be associated with declines in infant mortality. With respect to water supplies, the provision of piped water should not be regarded as synonymous with the mere laying down of pipes through which water either never flows or flows at irregular intervals. As a result of the irregular flow of water from the pipes, mothers who depend mainly on piped water have to resort to the feeding of their infants with non-piped water; feeding of infants with different quality water may constitute health hazards to the infants. The irregular flow of water might have also aided the development of a situation in which the use of supposedly less hygienic pan toilets exert greater positive impact on infant survival than the use of flush toilets. During shortages of piped water, an accumulation of human waste in water closets of households using flush toilets is inevitable. Human waste so accumulated could imperil the health of the infants as well as that of the parents through either the pollution of the house or through spreading by flies. It is to be noted also that pipes in Ile-Ife, as in many cities, are sometimes broken and are not repaired on time. Water from broken pipes are likely to be contaminated by surface waters and particles that enter the pipes through spots of breakages; in the absence of a treatment of water from such pipes before use, morbidity and eventual death of the infants could be enhanced. The present study tends to show that the provision of non-functioning social amenities may enhance rather than reduce infant mortality.

Second, the need for a clean environment is demonstrated by our results. An unhygienic environment is characterized by an indiscriminate disposal of human waste and other refuse around the house. Although its impact on infant mortality is not significantly different from those of other toilet facilities, the disposal of human waste in the bush with its attendant pollution of the air and spread by flies constitutes the greatest health hazard to the infants. Individuals should therefore be educated on the danger of disposing human waste in the surrounding bushes. Similarly, the dumping of refuse in open gutters should be discouraged as this is found to significantly enhance infant mortality.

Third, the fact that differences in the types of environment the mothers live in may interpret to differences in the survival probabilities of their children is demonstrated by this study. At the time of the study, the cost of medical care was so low as to make it possible for parents to give their infants the best medical care available in the area. Yet, differences still persist along differences in variables of the environment, the most significant of which is refuse disposal systems. This finding therefore calls for means of bridging the environmental gap among the different sections of our cities.

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THE IMPLICATIONS OF CULTURE CONTACT FOR THE DELIVERY OF HEALTH SERVICES AMONG NGAWBERE (PANAMA)

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A number of countries in the Third World have adopted policies which seek to increase the availability of health care in areas of difficult access. Many of these policies base their substantive recommendations on the notion that rural populations are in desperate need of cosmopolitan health services. A few countries (e.g., Nigeria, China, Mexico) consider the presence of traditional medical systems among the rural population of their nation-states and accommodate their health care programs accordingly. Unfortunately, policy-making at the national level in other countries does not consider the ramifications of implementing cosmopolitan medical services into an area where the local situation is at odds cross-culturally with the philosophy of cosmopolitan medicine.

There is a body of research in anthropology (e.g., Paul 1955; Saunders 1954; Erasmus 1952; Simmons 1955; Lieban

1976; Leslie 1976; Janzen 1978) that has pointed to differences in illness etiology between (cosmopolitan) providers and (local) consumers as the basis for the population's low use of cosmopolitan medicine. Very few of these studies, however, have examined the implications of culture contact for health care delivery when considering the interaction between providers and consumers as a form of exchange. The framework for the following essay considers the delivery of health services among Ngawbere of western Panama as an exchange relationship between provider and consumer and examines the effect of culture contact on this relationship.(1)

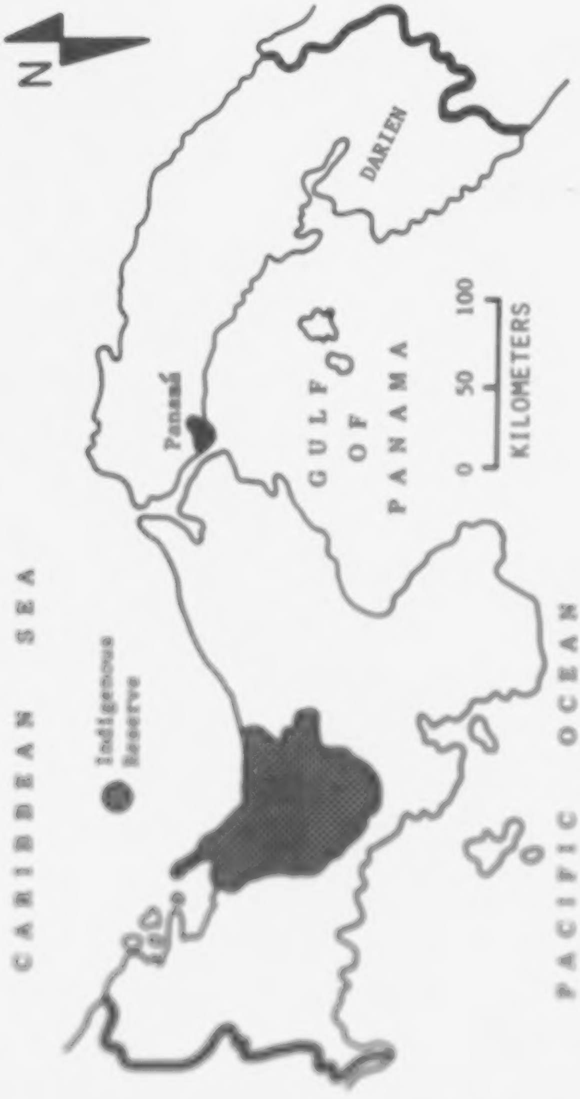
CULTURE CONTACT

Ngawbere are an indigenous population inhabiting a large tract of land in western Panama; Figure 1 indicates the location of the Indigenous Reserve. For the most part, they have remained isolated from extensive culture contact (Young 1971; Young and Bort 1979). Ngawbere base their land ownership on bilateral descent and rely on fishing-hunting/horticulture for their livelihood. They traditionally practiced polygyny (some still do), lived in dispersed settlements (many still do) and performed a number of rituals which now are prohibited by the Mama Chi movement (Young 1976, 1978). Today the majority of younger Ngawbere are bilingual speakers of Spanish as well as their native language ngawbere.

Contact with the outside world has been sporadic since the time of European contact. The first opportunities for wage labor employment came through the cattle haciendas established in the savannahs along the Pacific coast, beginning in the 1600s. Relatively few Ngawbere left the mountains to work, and those who did work did so in characteristic fashion; they worked for a brief period and then returned to the mountains, sometimes taking with them cattle for raising at home (DAI 1623; ANP 1889). Few other opportunities came until this century, when some Ngawbere began to seek employment on the coffee farms (Chiriqui Province) and the sugar cane plantations (Veraguas Province). The involvement of Ngawbere in wage labor has increased markedly since the 1970s (Bort and Young 1985; Bort 1983; Young 1985).

FIGURE 1

Republic of Panama, showing location of Indigenous Reserve (Ngawbere Territory)


N
CARIBBEAN SEA
Indigenous Reserve
Panamá
DARIEN
GULF OF PANAMA
0
50
100
KILOMETERS
PACIFIC OCEAN

On the Atlantic side, there have been few opportunities for wage labor. It appears that some Ngawbere in Bocas del Toro participated in commerce with the English-speaking Afro-Antillian fishermen who settled the coast in the early 1800s; reports indicate that they traded mostly sarsaparilla, pigs, cattle and corn (ANP 1873; Body 1871; Roberts 1827). Evidently, the opportunity for commerce diminished, and, with the establishment of the banana plantations in western Bocas del Toro Province by the United Fruit Company in 1899, coastal Ngawbere shifted their efforts and took to growing bananas which they then sold to boats periodically sent by the banana companies (ANP 1901; Reid 1980). Since the 1940s, at least, Ngawbere have been employed as laborers on the banana plantations of the Chiriquí Land Company(2) (Reid 1980).

It is important to note that with the exception of the Cerro Colorado copper mine (Gjording 1982, 1983; Morón 1982), no transnational corporation has actually penetrated Ngawbere territory. Instead, Ngawbere remain insulated in the mountains and avail themselves of wage labor as they feel inclined, a situation that has permitted them to maintain some degree of self-autonomy. One of the principal reasons Ngawbere have been able to maintain self-autonomy is a kin-based exchange system that produces most of the subsistence needs of Ngawbere society from the environment in which they live.

NGAWBERE SOCIETY

The basic unit of subsistence in Ngawbere society is the household (*hu*). The members of the household constitute the inhabitants of a single dwelling. They are responsible to themselves for the production of foodstuffs and share in the preparation and consumption of what is produced. The household also shares responsibility for anyone of its members, should he or she become ill.

It is the married couple acting as joint owners of a house (*hu bunkon*) who assume responsibility for household management. The husband-wife pair decide when it is time to go to the forest to work subsistence plots or secure food, when it is time to procure protein, and who will feed and care for the household's animals, if they own some.

The heads of households also decide whether they have sufficient food to spare if a family member visits the household in order to ask for food.

Since subsistence is so crucial to their livelihood, Ngawbere view subsistence-related social interaction within their own family group (*ha* *mroko*) as paramount. They emphasize in their social interactions with one another the primacy of first seeking assistance from kinsmen before requesting help from someone who is not related either consanguineally or affinally.

Assistance between households in Ngawbere society resolves into exchanges of foodstuffs, animals, materials, equipment, or labor and services. All exchanges assume reciprocity to some degree. Reciprocity is the balance of payment that occurs between two parties in kind or in value following the initiation of an exchange by one of the two. Sahlins (1965, 1968:81-83, 1972:93-196; 219-220) and Service (1966:14-21) identify 'generalized reciprocity' and 'balanced reciprocity' as the two basic types of reciprocity which occur in small-scale societies. The balance of payment can be forthcoming concomitant with the exchange or shortly thereafter, and may represent a value equivalent to what was initially exchanged (balanced reciprocity). Otherwise, the balance of payment is left open to the discretion of the receiver in the initial exchange; it may be part of an ongoing relationship with each person helping the other whenever possible (generalized reciprocity).

Generalized reciprocity occurs in Ngawbere society in nearly all forms of exchange and assumes "an obligation to circulate or give away (goods to another)" (*biandre*), if possible when requested, or voluntarily, with the expectation of (eventual) return. The time, amount and conditions of return are left open. The sense of obligation repeats itself when the giver, at some future date, becomes the person petitioning assistance. Balanced reciprocity in Ngawbere society represents any direct "equivalent exchange" (*kuitadre*) whether in kind or in value. It occurs less frequently than generalized reciprocity in Ngawbere society. The basis of Ngawbere exchange relations is that Ngawbere expect assistance when they need it, not because they can purchase it.

Consumable nonreturnable materials, nonconsumable returnable equipment and most foodstuffs are circulated on an ongoing basis between neighboring households. The circulation of such items assumes generalized reciprocity, and it occurs primarily with close kinsmen (cognatic relatives). If there is an increase in supply or value, the person securing something through the use of borrowed equipment is obligated to provide a share of what was obtained (ütiodre).

The exchange of items which are equivalent in kind and/or in value assumes balanced reciprocity which, in Ngawbere society, chiefly occurs with exchanges of domestic animals, and, occasionally, either raw or cooked foodstuffs. It occurs between distant as well as close kinsmen and sometimes even between other unrelated Ngawbere. There has been a slight increase in recent years of selling such goods as prepared food stuffs, firewood and lumber between unrelated households. Ngawbere describe the practice of selling with the same term they use for an "equivalent exchange" -- only now money sometimes is one of the items exchanged.

The exchange of labor and services among Ngawbere takes two forms. One is that of cooperative labor, and the other is that of the contract.

Cooperative labor can entail pooling labor, as well as resources, such as gasoline, fish line, boats, paddles, anchor rope or motors, for example, to procure protein by going fishing. It also can entail performing some task, such as two or more individuals constructing a house or making a boat, clearing a field using "festive labor" or assisting another in raising an animal. Ngawbere refer to all cooperative labor as "obligated to assist another in the role of subordinate" (ayudaire sibai). Generalized reciprocity is assumed in cooperative labor, since the participant who helps out the petitioner can, at a later date, request assistance. For example, this can occur when individuals rotate their labor by participating in each other's festive labor project.

The negotiation of a contract (kontrato) occurs when someone hires another person to perform some task or to construct something. It can mean securing firewood in quantity; building a boat or house; weaving a fishnet; carving a paddle or axe handle; or performing some portion of the overall task, such as building only the roof of a house, or building the gunwales and refining the hull of a boat. Each of these tasks also can occur as a favor (especially among relatives), but what distinguishes contract labor from cooperative labor in Ngawbere society is the exchange of cash. Hence, balanced reciprocity is assumed in contract labor, since the person petitioning the services pays the other a sum deemed to be equivalent to the labor used to complete the project.

Before discussing how the delivery of health services is imbedded in the system of exchange relations, the medical resources that are available to Ngawbere are described.

HEALTH CARE RESOURCES

Practitioners

There are three types(3) of indigenous practitioners of medicine who reside in Ngawbere territory. These are:

(1) health assistant (*ayudante de salud*) cosmopolitan paramedical training

(2) herbalist (*kroko dianko*) = folk medicine

(3) diviner (*dawngin*) = folk medicine

The health assistant provides simple treatments for minor health problems and serves as the initial contact in the referral system between the northern Valiente Peninsula and the cosmopolitan medical centers in Bocas del Toro and Changuinola, where non-Ngawbere physicians, dentists and nurses are available. The herbalist and the diviner(4) provide folk remedies of various kinds. They are located in the larger homesteads along the northern Valiente Peninsula and elsewhere within the Indigenous Reserve.

Folk Practitioners

The healership of the herbalist and the diviner is regarded as a "gift," which Ngawbere render as *don* when speaking Spanish. According to Ngawbere, these two practitioners are born to their office. Their knowledge is considered special wisdom (*ni tüboto*) which, it is believed, is acquired through the intervention of divine forces. Ngawbere say that the ability of the herbalist and the diviner to acquire special wisdom "flows with the blood from (the moment of) conception" (*dore bare kroko diankoa* and *dore bare dawngina*, respectively).

The herbalist (*kroko dianko*) is one who fetches, prepares and in some form dispenses herbal medicine. He gives prepared medicine to someone who requests it, or he gives advice on an appropriate plant and indicates its location and how to prepare it at home. The knowledge which forms the basis for this service is a combination of learned folk knowledge infused with a familiarity of the local forest environment. The folk knowledge is acquired by participating in formal oral dialogue (*ha ketare*) with other practitioners. Knowledge of the forest resolves into an awareness of the specific areas of the forest where the herbalist, his parents and his wife's family practice subsistence agriculture.

The principal function of the diviner (*dawngin*) in Ngawbere society is to sanction familial and communal vigils (*gütaw*) and the rite of abundance (*mötaw*). This he does during client visits to his home, or during his travels, in which people request his permission to hold the vigils or rites. The diviners who practice in the Valiente Peninsula also dispense botanical medicine. This can occur as a singular remedy or it can occur in combination with some other recommendation. For example, diviners frequently recommend herbal remedies in conjunction with the performance of the familial vigil. The diviner, like the herbalist, learns his craft through participation in formal oral dialogue (*ha ketare*) and by becoming familiar with the local forest environment. More often than not, it is the diviner, rather than the herbalist, who assumes responsibility for memorizing and performing the elaborate oral history articulated in the dialogues between healers.

Ngawbere who settled the Valiente Peninsula in the 1900s relied on themselves for health care; before that time the area was unpopulated. There were some families whose senior members knew enough about indigenous medicine to prepare botanical remedies; sometimes neighboring households consulted these men as herbalists. For more serious health problems, people traveled to Cricamola River to consult with one of several diviners who lived there.

Many decades later, a Cricamola diviner, upon request, formed a pact marriage with one of the kinswomen of a peninsular family which periodically brought him to the area. After some time, he began to train several young boys as novate healers. Four of these today serve as resident diviners in the larger homesteads of the Valiente Peninsula; the oldest was born in 1946.

Cosmopolitan Practitioners

The earliest record of the availability of Western medicine in Bocas del Toro Province dates from the 1880s. As a frontier area, government control was lacking and pharmacies (la profesion de farmaceuticas) located in the Municipality of Bocas del Toro competed with commercial stores which openly imported and sold medications without a license; at least one man was reported to have been practicing medicine without formal training (ANP 1894). Given the insulation of Ngawbere society from the coastal settlements, it is not known whether Ngawbere made use of these resources in any form or whether purchased medicine somehow found its way into Ngawbere territory.

With the advent of participation in wage labor on the banana plantations, Ngawbere obtained a closer view of cosmopolitan medicine although they themselves may not have actually made use of it. During Remon's administration in the 1950s, cosmopolitan medical teams visited isolated areas participating in what were known as "medical outreach" (giras medicas); some coastal settlements were visited, including the Valiente Peninsula. During this same period, rural schools were established along the Bocas del Toro coast; three communities received schools in the northern Valiente Peninsula.

Beginning in 1973, the Panamanian Ministry of Health began to establish health posts (puestos de salud) in areas of difficult access throughout rural Panama; see Figure 7. Their goal was to bring cosmopolitan medical services within

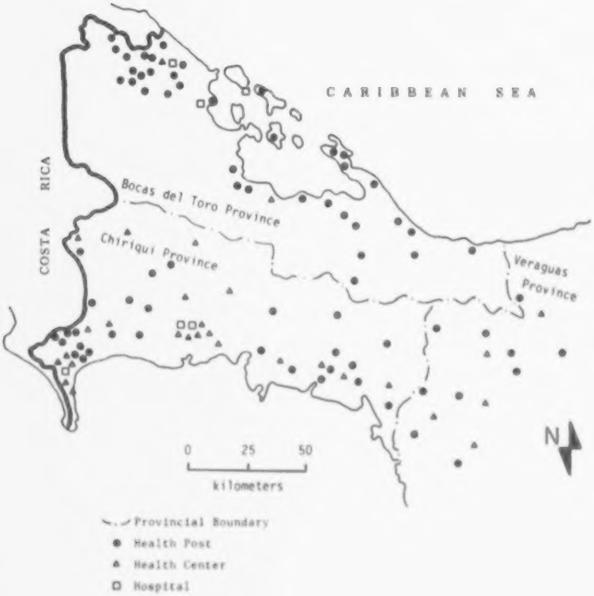

CARIBBEAN SEA
COSTA RICA
Bocas del Toro Province
Chiriqui Province
Veraguas Province
0 25 50
kilometers
N
Provincial Boundary
● Health Post
▲ Health Center
□ Hospital

FIGURE 2

Government health care facilities in western Panama, circa 1978-79 (based on Ministerio de Salud 1979). Note the "cartographic license" taken in depicting health posts in the Valiente Peninsula; the map shows three health posts in the central portion wherein there actually has been only a single health post. Five posts were staffed during fieldwork along the northern Valiente Peninsula (1982-1985). An interview with the Ministry of Health in June 1983 indicated that some 27 health posts were in operation in east-central Bocas del Toro Province; the map (above) that was published four years earlier shows only 19.

reach of all sectors of the national society (Engler 1983; La Forgia 1985). The local people refer to the health post as *la clínica*, or simply *klinikate* in *ngawbere*.

Several northern Valiente Peninsula residents have received the year-long training in Changuinola required to become a health assistant(5) (*ayudante de salud*). Five of these now staff the health posts located along the northern Valiente Peninsula. They receive supplemental training from time to time through seminars held in Changuinola. In addition, the Ministry of Health provides training for women who already are serving as midwives (*parteras*) in their communities. The training lasts several weeks.

The health assistants in the Valiente Peninsula are responsible for administering vaccinations, attending to requests for medical assistance and organizing the community for such services as potable water (specific details in Dirección de Docencia e Investigaciones 1976:1-5). They open the health posts on an almost daily basis, and even make themselves available in the evening and on weekends when someone requests their services. They keep some supplies on hand in their homes, moreover, which they dispense as they receive requests. In this manner, they do not need to retrieve supplies from the health post when they receive requests (generally for accidents or otherwise minor ailments) during hours they are not manning the posts. The Ministry of Health distributes supplies on a fairly regular basis to the health posts in Ngawbere territory. Some monies are available for gasoline for emergency trips to Bocas del Toro; at the recommendation of the health assistant, these trips (by boat) are taken in cases of severe injury or serious illness. The monies are administered by the community council (*la junta comunal*) in conjunction with the local health committee (*comité de salud*) which is comprised of the health assistants staffing the five posts in the northern Valiente Peninsula.

Remedies

There are six kinds of remedial care available to Ngawbere. These are:

1. folk remedies generated by the household
2. commercial remedies secured locally by members of the household
3. folk remedies dispensed by a local herbalist or diviner
4. basic cosmopolitan remedies dispensed at the local health post by the health assistant
5. folk remedies dispensed by distant diviner(s)
6. advanced cosmopolitan remedies/referrals provided through the urban-centered hospital.

Although some of the smaller homesteads along the northern Valiente Peninsula have neither folk healers nor health posts, the first four resources are available locally in the larger peninsular communities. The last two resources require extensive travel either to the provincial capital or Cricamola River.

Folk Remedies

There are a number of remedial actions prescribed by Ngawbere medicine which are used today in the Valiente Peninsula. Many of the actions are common knowledge and do not need the intervention of a healer in performing them. Members of the family or the household can decide to initiate them in caring for someone who is ill. These actions include the following three.

a. The ill person is restricted in activity (*ña dabadre powaine*). He or she generally remains at home for a period of convalescence, usually lasting several days. Subsistence work, fishing and traveling during this period are not permitted.

b. The ill person is restricted in diet (*ña dabadre kuete*). Restrictions on eating beef, turtle, pork, chicken and most kinds of fish (except *igwai* or *kotain*) are put into force for the duration of the illness. Condiments such as sugar and salt also may be prohibited. The simplest diet which is permitted is cooked yams (if in season) or cooked bananas (available year-round). The ill person has his or her meals prepared on a separate fire from that of the other members of the household. Ngawbere say that the sick individual "is passing through (a period of) ill fortune" (taw boine).

c. Limitations are placed on who may visit the ill person (ñaka dabaneme ni bren konti). Ngawbere claim that several events associated with certain phenomena in nature can make a person dangerous company for someone who is ill during the first five days of the illness. These categories include someone who has been bitten by a snake, suffered a shark attack, a pregnant woman and the man who impregnated her, or someone who has contacted a corpse or attended a funeral without thoroughly washing. Ngawbere say that the illness "has flaired up" (dairte) in cases of prolonged illness when any of these persons has visited the ill individual.

There are a number of other remedial actions which only the herbalist or the diviner can recommend. These primarily include the use of forest medicine which is taken orally or rubbed on the body. According to Ngawbere healers, there are five sources of medicine which are found in the forest. These include: plants (krire), vines (küre), water (nöre), stones (höre), and living creatures (ngire). Plants and vines by far are the most common materials used for preparing medicine in the northern Valiente Peninsula. Medicinal plants are not domesticated; most of the plants and vines are found in fallowing fields, trees or along streams and forest trails, rather than on the lands used for cattle pasture or around the house.

There are certain remedial actions which only the diviner can recommend. These include the all-night vigil (gütaw), as already mentioned, as well as other special remedies such as the nail point, leeching and ritual cleansing of the face. A special remedy, once it is sanctioned by the diviner, can be performed only by certain individuals the firstborn, an orphan, a twin or someone for whom the father is unknown. Others are disallowed from performing them. These persons generally are selected from within the family, if available; otherwise, someone else who is close kin is requested to assist.

Pressure point massage is a special remedy which only the diviner can perform. It also is the only remedy requiring that the diviner attend the sick individual. No others, neither the herbalist nor those who are not diviners, can recommend or perform pressure point massage.

Cosmopolitan Remedies

Several of the small consumer stores which are located in the northern Valiente Peninsula stock commercial health remedies. The most popular remedies include Mejoral, aspirin, menticol and Alka Seltzer. The local population also has access to the commercial remedies sold in Bocas del Toro, Chanquinola, Almirante and, more recently, Chiriqui Grande. These include a variety of pills, witch hazel, protein supplements, lotions and salves such as hierba-cura. Wage laborers and others known to be making trips outside the area are approached by Ngawbere with requests to obtain these remedies.

Otherwise, cosmopolitan remedies are available locally from the health assistant. The basic purpose of the health assistant is to provide a preliminary diagnosis of whatever health problem is presented at the health post or to which he has been summoned. He then assumes responsibility for deciding whether it requires professional attention, in which case he recommends that the client seek help in Bocas del Toro or Changuinola, or whether he has some basic remedy on hand which can treat the problem. The health assistant stocks various medications for colds and minor illnesses associated with fever, vomiting and diarrhea; stomach pains and, more recently, certain gastrointestinal problems; anti-snake serum for some types of snakebite; antibiotics such as ampicillin for minor infections or infected insect bits; and an array of bandages, splints and a transport carrier for the injured. The health assistant provides medications which can be taken orally and some ointments which are rubbed on the body. In addition, each health assistant has been trained to administer injections and assumes responsibility for administering the vaccinations which are distributed throughout the country. The Ministry of Health provides the vaccinations as required by law for younger persons, particularly the infant population. In emergency situations, the health assistant arranges transportation for seriously injured or gravely ill individuals.(6)

The services provided in the urban medical centers are more extensive than what is available through the health post. These services include treatment for major physical trauma, such as broken bones, lacerations, burns, etc. Diagnostic services in the form of X-rays and laboratory screenings also are available. From the urban medical facilities, some clients are referred to medical facilities in Panama City or Chorrera, where special medical units handle such problems as polio, tuberculosis and cancer.

Since there are no doctors or dentists in private practice in the Bocas del Toro Province or with the Chiriqui Land Company, the only available medical professionals work in the hospitals and medical centers which are located in the western portion of the province rather than in the eastern area comprising Ngawbere territory. Whereas the paramedical personnel who staff these facilities have been trained through the Ministry of Health, the physicians, nurses and dentists who staff the hospitals have received training elsewhere, generally through the University of Panama Medical School, and hold licenses to practice validated by the Panamanian government. The professional medical personnel in western Bocas del Toro on the whole are non-indigenous, in comparison to the para-professional Ngawbere who staff the health posts along the eastern coast. Thus, all cosmopolitan medical care is provided through the Ministry of Health, and medical professionals are located only in the western half of the province.

Medical Care Cost

As many Ngawbere expect the healer to provide his services within the context of the give-away, some folk healers do not set fees for their medical services. They provide herbal medicine and advice, as they are able, as a part of an ongoing exchange relationship; when they are in need they expect to be assisted in return. A few folk healers, however, have set "fees" by which clients may compensate them in cash. Those who have set fees for their services generally lack a reliable source of cash (for example, a son performing wage labor). They prefer a certain amount for consultation and a separate amount for each bottle of medicine or whatever particular remedial action they may recommend. Clients pay when and if they feel a cure has occurred.

The health assistants work within the payment for services schedule formulated for them by the Ministry of Health. The cost of the services, including medications, is roughly comparable to the fees set by the folk healers. There are two programs through which Ngawbere avail themselves of the health post services. One is the occupational health program, and the other is the rural health program.

Ngawbere men who are working as wage laborers pay a compulsory premium as part of the government's occupational health program (about 1.3% per month, regardless of income level). The rights for medical attention through the program extend to the worker's immediate family, which includes spouse, children under sixteen and the worker's parents (Diaz Merida 1983). The program does not cover the parents of the spouse. Since family members usually remain in their homestead while the worker is elsewhere (for example, residing in Changuinola), it is the family rather than the worker who make frequent visits to the rural health posts. The workers from the Valiente Peninsula who recently worked in Chiriquí Grande paid bimonthly premiums for the compulsory insurance. Similarly, those who work with the banana companies are covered under the program. A worker who loses or leaves his employment loses his right to free services through the occupational health program. Instead, those persons who have no visible sources of income have a right to receive medical services through the Ministry's public health program.

The rural health program, including the efforts initiated in Bocas del Toro in 1975, is part of the public health program. Under this program, the Ministry uses a sliding scale to determine the fee for clients. The scale is based on regional rather than individual income. For Ngawbere living in the Valiente Peninsula and elsewhere along the coast, the fee for consultation is 25 cents per consultation apart from the cost of medications, injections or other treatments. The most expensive treatments are for snakebite, averaging about B/.10 per serum injection. By way of comparison, the "fees" set by the snakebite curers vary from one curer to another, and they tend to be slightly more expensive than the Ministry of Health snakebite treatment and greater than the fees set by the healers for other kinds of botanical medicine. Vaccinations at the health post are given free on a periodic basis to everyone in the area; this generally is done for infants and young children not yet vaccinated.(7)

HEALTH CARING AS EXCHANGE

Among Ngawbere, health caring is one kind of help seeking among several.

The care of someone who is ill in Ngawbere society remains the primary responsibility of the household in which the person is living, if the members are able to care for the person adequately. Otherwise, the responsibility falls to some other household whose head belongs to the family into which the ill person was born. Health caring is an obligation for those who stand in some close social relationship with the ill individual. Sometimes the ill person must rely upon himself, if the treatment needed is very minimal. Most of the time, the responsibility for health caring falls upon one's spouse; one's parents, if alive, able-bodied and living nearby; one's children, if older, living at home and lacking school commitments, or if living as neighbors; and one's siblings. Spouse's parents, nieces and nephews, cousins, even "co-parents" are other relations who may join in to help in some way with health caring during an illness. Hence, close cognates and lineal relatives, along with one's spouse, assume the major responsibility for the health caring process, just as these social relations are the primary ones with whom kinsmen interact for purposes of subsistence-related activities.

As one of several kinds of assistance between households, the basis for health caring is generalized reciprocity. Time and medical resources comprise the basis for exchange in the health caring process. Health caring originates within the ill person's household. What occurs frequently when an health problem is serious is that an exchange of time and medical resources come in bulk from other households comprising cognates, neighbors and even affines.

In this way the response to a health problem does not overburden the household in which it occurs. Health care assistance is requested as needed, or it may be forthcoming voluntarily simply because someone who stands in a social relationship with the ill person feels inclined to help out. There invariably exist sufficient relations with kin that someone steps in to help out when an illness occurs, even if those who are the closest kin elect not to participate in the health caring process.

The Cost of Medical Care

The provision of botanical medicine in essence is a form of circulating materials, namely, the actual plants that are used and the knowledge that is needed to prepare them as medicine. The healers in Ngawbere society often keep a supply of plants in their homes for the more common illnesses for which they receive requests. They also advise people on where to find the plants and how to prepare them to make medicine, in situations in which they are unable or unwilling to fetch the plants themselves. Recommending other kinds of remedial action is considered a form of give-away between the healer and a client; the healer is viewed as having better than average knowledge of Ngawbere medicine, which is not secret, but something of benefit for all Ngawbere.

Generalized reciprocity is assumed when the healer and the person making the request are close relative, especially if the petitioner or someone in his family has a skill of his own, such as carpentry. Otherwise, the folk healer prefers to conclude the transaction with a client through the payment of cash at the time the medicine is dispensed or, sometime later, when the ill person is cured. Therefore, dispensing botanical medicine assumes generalized reciprocity between close relatives and balanced reciprocity if it occurs between distant relatives or those who are non-family.

In contrast, the dispensing of cosmopolitan medicine is performed as a labor contract rather than as the circulation of medicine or as a (medical) give-away. The health assistant informs the client of the Ministry of Health fee schedule generally at the time consultation is initiated. From the beginning, the client knows what is expected of him in terms of paying the health post for its services, just as occurs in paying the contractee at the completion of a labor contract.

MINIMIZING THE COST OF MEDICAL CARE

There are several means that Ngawbere use to circumvent or minimize the cost of medical services. Two of the ways constitute tactics used by the consumers of the services, and the third is an option given to the consumer by the provider. All three means share in common the basic expectation inherent in help-seeking in Ngawbere society: Ngawbere expect to receive help when they need it, rather than receive help only if they are able to purchase it.

The first tactic is that of paying an amount under the "established fee." It frequently includes non-payment of the fee. The client usually proclaims hardship as the time approaches for payment or at the time the request for medical assistance is made. The client may promise to give something at a later date generally with the intent of paying the amount as completely as possible. The client alternatively may give a little of what he owes and indicate that his circumstances do not appear to be improving. He is saying in effect that he is unable to make full payment even at a later date. Clients occasionally petition the practitioner to provide the services as a favor (a give-away), calling attention to their social relationship by using the healer's family name, if in fact they are family, or, if not, a kin term referring to their affinal relationship. Petitioning for medical services to be given free occurs both with the folk healers and the health assistants.

The second tactic is receiving monetary assistance from another household which either "loans" or "gives-away" part or all that is needed to pay for the services received. Frequently, a sibling or lineal relative is approached and requested to assist the petitioner in paying for medical expenses. The request for assistance also can include petitioning another household outright to purchase the required medications, if someone in that household is in the wage labor force. Elderly Ngawbere occasionally are approached by someone younger and asked to identify plants which have been recommended by the healers. Generally, they receive something other than cash in gratitude from the young, or they receive nothing more than the opportunity to help out. The request to another household sometimes entails requesting leftover medicine, similar to what the practitioner has recommended, that is known to be available in a neighboring household, since it was acquired for an earlier illness resembling the current one. There were no instances recorded during fieldwork, and no one could recall an instance, in which people sold cattle in order to obtain the money needed for medical services. Borrowing money or requesting a favor by far were the more common practices. Requests to other households are made, therefore, with the expectation of receiving a favor, that is, the household approached is expected to assist as part of the system of general reciprocity without thought of compensation.

Ngawbere recently have instituted the practice of borrowing social security identification cards in order to secure services at the health post. The household being approached takes into account their obligation to assist others in the family. They, therefore, readily loan the cards. People are able to use the cards since the Ministry's intake records require only a person's social security number, not the name of the person receiving the service. Similarly, if the request to another household is to borrow money or purchase medication outside the community or provide money for gasoline to visit a distant healer, those who are working consider their obligation to help out family members who may not enjoy access to cash or find themselves unable to travel far outside the community. Hence, the request to purchase an outside medication also is honored fairly regularly.

The final means of minimizing medical costs is an alternative posed by the practitioner. This customarily occurs in instances in which the practitioner of indigenous medicine expresses interest in some favor that a client may perform for him (that is, balanced reciprocity). The healer may mention that the client or a relative of the client possesses certain skills, such as carpentry, or has access to certain materials, such as that enjoyed by wage laborers. Sometimes he may show an interest in certain natural materials, such as firewood or bamboo and palm thatching for roof repairs, especially if his own farm lands do not have these materials. The diviners in the northern Valiente Peninsula, for example, do not request money from those who have helped to build or repair their homes. Thus, there is some variability in the assumption of reciprocity in requesting the services of a folk healer. Unless one is close family, in which case generalized reciprocity is assumed, receiving medicine from the folk healer implies payment of some kind for his services (balanced reciprocity).

The possibility of exchanging some favor for medical assistance does not occur in the transaction between a health assistant and his client. The health assistants perform major tasks on their own rather than expect those receiving their services to help them out. This is because they receive a small stipend from the government and cannot expect to invite clients to help them under the guise of a lack of personal funds or their need for a favor.

Both the folk healers and the health assistants, on the other hand, expect to receive transportation when they are requested to visit someone who is ill. This occurs when the ill individual lives some distance from the practitioner's residence and boat travel is required. The practitioners rarely if ever provide their own money for gasoline for sea travel to see someone who is ill. The healers, it should be noted, travel more extensively than the health assistants. Each health assistant restricts his activities to the immediate area, since the more distant areas already are covered by other health assistants. The healers, in contrast, sometimes travel as far as Rio Cana to the east or the Chiriquí Lagoon area to the west. Several healers, moreover, make periodic trips to the banana plantations in order to provide botanical medicine to the workers and, if present, their families. Their visits coincide with pay week.

SUMMARY AND CONCLUSION

Dispensing botanical medicine traditionally was a form of give-away wherein someone who was experienced with forest plants shared that knowledge, when asked, by giving advice or securing medicinal plants on behalf of someone who was ill. Healers were people with extensive empirical knowledge of the forest; some were prepared in the healer role from the time of birth (the diviners), whereas others simply accrued experience on their own (the herbalists). Requests to the healers were met by circulating the knowledge of medicinal plants (where to find them and how to prepare them, etc.), since medicine never has been a secret domain of Ngawbere culture. Some healers secured the plant(s) themselves, which they then gave to a household with instructions on how to prepare the medicine. "Giving away" is still the basis for the delivery of indigenous medicine. Ngawbere frequently speak of the role of the healer in terms of "giving for (the good of) others" (ni bien ie).

Ngawbere exchange relationships have been complicated through culture contact. More than in the past, Ngawbere make use of exchanges that rely on balanced reciprocity. With the introduction of cash into Ngawbere society and a growing dependence on money, alternative kinds of exchange have been generated in order to accommodate new material goods such as boats with outboard motors, social security identification cares, store clothes and even cash itself. There also has been a general increase in the use of contract labor; in the past, Ngawbere relied principally on cooperative labor to meet their subsistence needs. Balanced reciprocity forms the basis now for more kinds of exchange than in the past, although by no means has the principle of generalized reciprocity been replaced as the basis of Ngawbere help seeking.

The introduction of the health assistant who works with the government fee schedule and the setting of fees by some folk healers are one response to the growing dependence on cash in Ngawbere society. The payment of money for medical assistance, however, is more lax than in projects negotiatied as true labor contracts. The amount actually received by each type of practitioner, in practice, therefore, does not correspond to the amounts they should be receiving over a period of time according to their respective free schedules.

There has been little change in the basic medical knowledge that is used within the household for home remedies, although there are indications that the younger generation knows less of the prescribed (Ngawbere) use of forest plants than their parents and grandparents. The prescription of prohibited actions continues in connection with illness and often is initiated from within the household.

The sense of self-autonomy that has characterized Ngawbere society for centuries continues on, and the minimization of medical case costs in response to the growing dependence on cash suggests that Ngawbere will continue to maintain their self-autonomy as much as possible. No doubt the exchange relations that characterize health caring will keep pace with the increased use of alternative forms of exchange. Although the practice of help seeking within Ngawbere society will grow more complicated, its basis in generalized reciprocity will remain.

NOTES

1. Dissertation research was conducted from March 1982 to April 1984, and from November 1984 to April 1985, among Ngawbere of the northern Valiente Peninsula; occasional trips were made to visit Ngawbere living in Río Jalí (adjacent to Cricamóla River) and those inhabiting the islands of Chiriquí Lagoon. Support for the research was received from a Fulbright Full Grant, Organization of American States Fellowship, Community Services Administration Fellowship and a National Science Foundation Grant for Improving Dissertation Research.

2. The Chiriquí Land Company is a Delaware-based subsidiary of United Brands Company (once the United Fruit Company) and is responsible for the operation of the banana plantations in Panama (McCarthy 1976:67, 78, 97). The Company's two principal locations in Panama are Puerto Armuelles (Chiriquí Province) and

Changuinola/Almirante (Bocas del Toro Province). See also Young (1976:94-95) and Ch. de Pinate (1951).

3. There are two other practitioner roles in Ngawbere society, namely those of the preacher and the prophet. Their activities, however, focus more on socio-theological concerns; they invariably are associated with the Mama Tata movement. Occasionally their efforts touch on health matters (compare with Young 1976:91n, 1978:61n), but rarely in the northern Valiente Peninsula. For that reason, they will not be considered further in this article.

4. The methods of practice for the herbalist and the diviner in the provinces of Veraguas and Chiriquí are described briefly by Mendizabel de Cachafeiro and Zentner (1963:64-68). Having visited the same area of Cricamola River (albeit one hundred years apart), Pinart (1887:43-47) and Reverte Coma (1963:79-80) mention only the diviner or *sukia*. Their respective descriptions of the diviner are sketchy and appear to combine characteristics of both the diviner and the herbalist.

5. The local residents refer to the health assistant as *dispensarist*, or jokingly as *doktor* alluding to his preparation in cosmopolitan medicine. The term *dispensarista* originated in connection with the banana plantation and Cerro Colorado copper mine health programs sponsored by the Panamanian government. The Spanish term was intended to refer to the person who was only prepared to "dispense" medication, rather than the individual (*ayudante de salud*) who was trained to respond at the grass roots level with preliminary diagnosis and remedy/referral.

6. The health assistant also monitors births in conjunction with the midwife. Neither he nor even the folk healer is allowed to be present, however, since Ngawbere prohibit men from attending births. Hence, the health assistant customarily administers an injection following the birth in order to reduce the risk of post-natal infection.

7. There were other programs. For example, the Ministry of Health sponsored the installment of a system of potable water conduits (*aqueducto*) in the communities of Cusapín, Guacamayo, Cayo Paloma, Tobobe, Sirain and Bahía Azul in the late 1970s; all but the latter community have health posts.

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THE INTRODUCTION OF HIGH-TECHNOLOGY INDUSTRY IN TULA, HIDALGO, MEXICO: HEALTH CARE IMPLICATIONS FOR THE SEMI-URBAN PEASANT CLASS

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INTRODUCTION

Since the Revolution of 1910, Mexico has perceived of itself as a nation striving to dismantle the institutionalized framework of inequality that resulted in a massive sector of its society, characterized by low education levels, unemployment and underemployment, little chance of upward social mobility and poor health and nutrition conditions. Prior to President Lazaro Cardenas' term in office, when the immense land reform redistribution scheme was pushed into effect, revolutionary zeal was accompanied by very little other than rhetoric and the floundering of a newly established system of government. However, since the 1930's, Mexico has been a leader in Latin America in implementing programs of development designed to push the nation into becoming a fully modernized country with a populace no longer subject to the disheartening and demeaning forces of inequality. Mexico has had great success in its drive for modernization, however, a large number of its people still suffer from malnutrition and preventable diseases.

This paper examines the role of technological development in population development as related to health and nutrition standards. The population under examination lives in a distinct section of the rapidly urbanizing small city of Tula de Allende, Hidalgo, Mexico. They comprise what perhaps may be most appropriately termed the semi-urban, peasant class. The construction of two high-technology industries on the outskirts of the city has had enormous influence on changing the demographic structure of Tula as well as providing the major impetus for urbanization and modernization of what was, fifteen years ago, a sleepy, small industrial, agricultural-based district capital. The attempt is made here to assess the economic, social and, particularly, health status ramifications on the population in question by comparing the impact on the high-technology industries with information available from other regional economic development assessments as well as studies of industrialization and its effects on a population's health beliefs and practices.

GENERAL BACKGROUND

The city of Tula de Allende is located 80 km. northwest of Mexico City in the arid Mezquital Valley of the state of Hidalgo. In 1972, the population of the city numbered 38,685 inhabitants. Estimates give the present population of the city to be at or near 60,000 inhabitants. The increase is due primarily to the influx of Mexican nationals who have immigrated to Tula to work in the oil refinery and thermoelectric plant, both of which began operations in the early 1970's.

The specific population group under examination here are the residents of the colonia El Tesoro, generally considered to be the most economically deprived section of the city. The colonia is situated on the flanks of the promontory upon which the ancient Toltec civilization built their capital city of Tolan, which thrived from approximately 900 to 1200 A.D. A primary source of income for the approximately 2,000 residents of the colonia is the manufacture and sale of mementos, archaeological reproductions and fake antiquities as well as genuine artifacts to the many tourists who come to visit the archaeological site. Other occupations include working as plasterers, brick-layers, laborers and household servants for the wealthier families of Tula.

The community-specific data that is utilized here to analyze the health care patterns of the colonia residents, specifically in response to the introduction of a sophisticated industrialization, is derived from a five-month period of field study conducted in 1983 and 1984.

The Colonia El Tesoro:

The colonia was founded in the late 1930's as part of the revolutionary ideal of land redistribution finally initiated by President Lazaro Cardenas (Finkler 1973). The area was divided into lots which were primarily intended to be utilized as housing construction plots rather than agricultural land. The neighborhood occupies three sides of a plateau which extends back into a valley that is not included as part of the ejido property. The terrain is dry and barren which, compounded with the steepness of the incline, makes the property virtually useless for agricultural purposes. The original colonizers, or *loteros*, secured a lot by demonstrating need. As families have grown and the lots have all been awarded, the number of houses on each lot has increased so that there are now at least two or three houses occupying a space originally intended for one family and their livestock.

Living conditions are crowded; there is an average of five persons to each two-room house. Water is piped across the Tula River which divides the *colonia* from the rest of the city. The water pump is frequently out of commission whereupon the *colonia* residents must utilize the public water fountains in the center of the city for all their household, sanitation and drinking purposes. Virtually every family keeps a barrel or two full of water, often left uncovered, as insurance in case of a pump breakdown.

Housing construction materials initially include laminated sheets of aluminum, loose sheets of cardboard and wood and brush supports until a family has accumulated enough money to invest in building a concrete block structure with cement floors and an aluminum sheet roof. Water spigots were put in each lot early in the 1970's. Of the approximately 350 houses, a handful have indoor plumbing. Each lot and the houses built on it usually share a common latrine and washing facilities.

The Tula River, which flows around the base of El Tesoro essentially comprising a geographical and cultural barrier from the rest of the city, is a repository for sewage from Mexico City as well as from Tula. The oil refinery also uses it as a repository for much of its waste. Alive ten years ago, the river is now dead. It is still used for agricultural irrigation purposes for small *ejido* plots further downstream.

A primary school was constructed in the *colonia* six years ago. It lists its attendance at over two hundred students. Attendance fluctuates greatly and is often dependent upon financial resources, e.g., whether there is an event planned wherein the student had to purchase a costume, a notebook and pencils are needed, a child is needed at home to care for younger siblings while the mother goes out to work, etc. Only a small minority of the adult residents have completed the first six grades of schooling. With the exception of two individuals, no one has gone on to complete high school.

The *colonia* residents have traditionally occupied the lowest positions in the occupation sphere. The original founders were *caragadores*, bearers of market produce. Their children have worked as periodically hired laborers and household servants. Only in the past ten years has there been a significant shift to other occupational levels, namely that of artisan production. It is a more rewarding profession in terms of income if one is able to maintain a steady working schedule.

While an *ejido*, El Tesoro is strictly non-agricultural. Although the classical model of peasantry is one defined by the concept of agricultural self-sufficiency, the residents are peasants in the sense that, as an economic and social unit, they are subordinant to a dominant economy (Stavenhagen 1978:32). And indeed, they share the dominant characteristic of poverty and its implications with the rural peasantry of their country. Lewis (1967) has described the underdeveloped economy as one divided into the "capitalist" sector and the "subsistence" sector, which only minimally interact. The subsistence sector, with which the El Tesoro inhabitants would be identified, perform the function of providing the capitalist sector with a cheap and undemanding source of labor. Certainly this is true in the case of the *colonia*, whose residents are considered lucky when they are able to find work with the capitalist sector at whatever wage it is willing to pay. Thus, they are subordinant to the greater society and economic system and can be considered as peasants.

Although in a semi-urban, non-agricultural setting, the El Tesoro residents are very similar to other Mestizo peasant communities in social and economic characteristics, particulary in reference to their position relative to the nation. In regard to health practices, beliefs and circumstances, El Tesoro can be likened to many of the other communities in Latin America that are undergoing modernization and urbanization processes.

Health/Disease Characteristics

Historical: There are no data specific for Tula de

Allende. However the reports of medical doctors working in nearby towns during their obligatory years of repayment to the state illustrate the conditions that existed in the 1940's prior to the industrialization of the area. In each case, the water used for human consumption was found to be contaminated as a result of drainage of sewage into the river or ground water wells. The most frequent infirmities encountered were typhoid, para-typhoid, amoebic dysentery, bacterial dysentery, pneumonia and bronchopneumonia, and venereal diseases. In addition, turburculosis was quite frequent as was the incidence of malnutrition attributed primarily to the quality of foods eaten and mother-child feeding practices (Granados Ballesteros 1945; Portilla 1948; Perez 1941; Soto Mora 1940). It is apparent that malnutrition enhances susceptibility to the parasitic and infectious diseases most commonly suffered in communities such as El Tesoro (Arteaga 1974). A case can be made for the high incidence of infectious diseases in these communities as a direct association with a concomitant high level of malnutrition.

Present: There are numerous reports demonstrating that health conditions have not much improved since the 1940's. As an example, malnutrition has been attributed to the underlying cause of death in fifty-two percent of all deaths of one- to four-year olds in Latin America (Berg and Muscat 1972:187). Population growth rate as a total in Mexico for the last 70 years has been at 3.3 percent, although there is a downward trend in birth and death rates which are still consistently high (Behm, Gutierrez and Requena 1972:13). The extreme population growth has had an effect on health characteristics. Providing adequate nutrition, housing, sanitary facilities, etc., is an even-more difficult task, especially when not enough jobs can be created to accommodate the burgeoning working class (LBJ Report 1982:12). These factors are essentially the same as those that were dominant influences in the poor health conditions of the rural poor almost half a century ago.

In a study of health and nutritional status of a "working class" urban community of southern Mexico, very similar to El Tesoro in social and economic features, Graedon (1976:451) notes that nearly two-thirds of the illnesses suffered relate to respiratory and gastro-intestinal problems, the inevitable companions of chronic undernutrition. The study area, the colonia of San Jacinto on the outskirts of Oaxaca, shares many of the same physical and environmental conditions with El Tesoro. Refuse is discarded wherever possible, as there are no officially sanctioned, constructed or maintained refuse collection areas. In San Jacinto, it is usually thrown into a nearby ravine, in El Tesoro it is tossed down the embankment into the river below. In neither locale are there sufficient sewage disposal systems. Human waste is a major contaminant of the water source. There is a lack of running water making cleanliness and sanitary procedures virtually impossible to be achieved on a daily basis. Employment is erratic in both city colonias, average educational level of adults is much below the first six years of schooling and school attendance is unreliable (Graedon 1976).

Graedon conducted a survey of the households to document morbidity rates. In one out of ten households with infants and one out of twenty with preschool children, the youngest members were reported to have been sick repeatedly, an average of one in three days. Many of the diseases are seasonally related; the highest frequencies of gastro-intestinal disturbances occur during the rainy season when the water supply is more likely to be contaminated through run-off. Conversely, the respiratory illnesses are more severe in number during the dry, cool part of the year when the mucous membranes of the respiratory tract are in greater danger of infection (Graedon 1976:151). These seasonal conditions prevail in Tula and have a similar effect on the sector of the populace already at greater health risk because of their socioeconomic status.

Diet in the colonia of El Tesoro consists of the staples of tortillas and beans supplemented by a variety of vegetables, fruits and animal protein. Seasonality also enters into the health picture here as many of the vegetables and fruits are from a wild food source, the hillsides surrounding the city. The animal protein available include chicken, pork, or the rare piece of beef, although its consumption is directly related to the family's socioeconomic status. Essentially, as in San Jacinto (Graedon 1976:206), the majority of energy in the diet is derived from carbohydrates rather than from protein or fat. A clinical assessment of 109 children from San Jacinto revealed that over one half of the children exhibited one symptom of poor nutritional status (Graedon 1976:293). The implications based on the similarity of social and economic structures as well as environmental and seasonal factors are that El Tesoro inhabitants suffer a like degree of malnutrition and incidence of disease.

The availability of food and its consumption are two distinct aspects of a community's diet and are directly related to a population's nutritional status. Cravioto (1958) has suggested that the cultural practice of not supplementing food intake sufficiently during the later stages of breast-feeding and during weaning is an integral factor in the high incidence of infant malnutrition in Mexico. DeWalt and Pelto (1977:84) noted that in the small city of Nopalcingo, Hidalgo, conceptions about food qualities varied widely as did consumption practices. Differences were related to economic status as well as to variation in accessibility to information. However, it was found that regardless of the food beliefs held by the female head of the household, family members were not fed more of the foods that were considered highly nutritious (DeWalt and Pelto 1977:87). Even though cultural factors such as preparing corn by soaking it in a lime solution which adds calcium and releases greater amounts of niacin (Squibb et al. 1959) are influential in determining the adequacy of a population's diet, the factor of economic status is extremely important (Azurdia et al. 1963; Arriaga and Davis 1969; Oshima 1967).

The overriding feature of the El Tesoro dietary status is that dietary adequacy corresponds directly to the level of family income (LBJ Report 1982:30). As a peasant population existing on the fringe of the working class, El Tesoro residents have little opportunity to provide for themselves and their families a consistently nutritionally adequate diet.

Health Beliefs:

Although in a semi-urban setting, the populace of El Tesoro have maintained many of the elements of traditional medical folk belief, as they have other social structures such as firm familial ties, a strong compadrazgo system and a professed religious devotion.

The hot-cold dichotomy is an integral feature in Mexican peasant folk belief and many of the illnesses or health conditions perceived by the peasant society are directly related to it (Logan 1973). The hot-cold dichotomy is deeply entrenched in the Mexican peasant's conception of the forces that act upon his/her body to create certain conditions and ultimately on the steps that must be taken to correct those conditions (Madsen 1961).

Aire, perceived as winds or bad air, can cause paralysis, seizures, vomiting episodes, chills, fever and a number of other conditions (Ingham 1970). Persons are particularly vulnerable to aire when something disrupts the hot-cold balance within their body or immediate environment. The kind of cure sought often addresses the cause rather than the symptom, with the rationalization that removal of the cause will restore harmony, thus eliminating the symptom (Adams and Rubel 1967:348).

Mal de ojo can be more appropriately translated as forceful eye or gaze, rather than utilizing its literal translation of bad eye. Individuals within the community are noted for their ojo fuerte, or strong eye. The persons that fall prey to it are usually notably weak in some way. Either they are young children with little resistance or commonly adults who have recovered from a long and serious illness. The symptoms include dizziness, weakness, often diarrhea, loss of appetite and a tendency to indulge in crying spells. The forceful gaze is considered to be one that derives its strength from heat (Ingham 1970:80).

Another illness, although not so common in this area of Mexico anymore, is susto, or fright. It is suffered after a particularly traumatic event often associated with supernatural visions. While older adults in El Tesoro spoke of susto as a phenomenon that had occurred in their lives, the younger and middle aged members made reference to it in a joking manner, indicating that one had to be slightly imbalanced or too "boncho," too much like an Indian, to seriously believe that one could see the Devil's spirit.

Treatment of mild cases of aire and mal de ojo, along with a variety of other ailments, is conducted in the home, usually by the female head of the household. Treatment involves repeating those procedures seen in previous visits to the curer and includes cleansing the patient with naturally scented puril branches or a fresh egg. Cleansing refers to a withdrawal of the disruptive force within the body through the action of wiping the branch of egg over the patient's body. A prayer is usually incanted during the ritual. Often a votive candle is purchased and lit in front of the individual's patron saint.

The transition from a system of folk medicine practices to a modernized system of professional, Westernized medical care becomes apparent when the patient cannot be cared for at home with the standard remedies. In the past, the next step would have been to take the patient to the local curer, curandero. With increasing modernization involving industrialization, population growth, greater communication outlets and accessibility plus improved educational levels, a modern medical system with its physicians, nurses and other personnel has been integrated into the city of Tula and provides the colonia residents with another option of health care.

The existence of a modern medical care system does not imply a population-wide disregard of the traditional curer. It was found that in the city of Bogota, Colombia, the poorer sector of the society tended to diversify his/her utilization of non-medical and medical services, shifting from folk to modern medicine with ease in accordance with what they felt their requirements were (Press 1971). McClain (1977) noted that in the modernizing community of Ajijic, Jalisco, those individuals who were more traditionally oriented participated in a more flexible manner in the health systems available than did those individuals who were considered to be more modern-oriented. While the author makes no mention of socioeconomic variables, a grave omission in an analysis of health care practices, it may be postulated that those individuals more traditionally oriented composed the peasant stratum of society. By inference, this group had less financial resources and consequently utilized the health services in a manner to best accommodate their budgetary constraints.

The curandero principally utilized by the El Tesoro inhabitants has remained steadfast in his approach through his thirty-plus years of practice. He has a strong religious focus and demands that his patients profess a similar devoutness. His curing procedures involve the use of cleansing with puril branches blessed with holy water and a "laying-on-of-the-hands" wherein he moves his hands gently over the patient's body, chanting a prayer while in a trance. Since the curandero is of advanced age and finds it difficult to maintain his stamina, his two disciples take care of the majority of cases. They also follow the ritual of falling into a trance, reciting prayers and cleansing the patient's body with their hands and with branches. Medication prescribed is bottled on the premises, or directions are given so that an individual can make his/her own. Pharmaceuticals are not utilized. There are no set fees for service; patients are asked to pay what they feel they can afford.

Colonia residents often prescribe their own medication or consult with one of the three local pharmacies before purchase of a drug designed to alleviate symptoms such as sore throat pain, nausea, fever, etc. A standard cure for a case of aire is the inhalation of ether fumes, a capsule of which can be purchased at the pharmacy. Although birth control pills are readily available without prescription, a more common means of artificial birth control practiced by the El Tesoro residents is the injection of an abortant, also available at the pharmacy without prescription. Several members of El Tesoro have learned to give injections and do so for a small fee. In the utilization of the pharmacy for a variety of medicinal and health purposes, the El Tesoro populace have demonstrated a dual approach to the medical system, much in the same way as has been demonstrated by other urbanizing populations (Press 1969).

However, complete utilization of the modern medical system is prohibited by the high expense of medical and hospital services. The direct relationship between socioeconomic status and physical utilization has been established (Hyman 1970:387) and this phenomenon certainly holds true in the El Tesoro case. Financial factors are elemental but so too are cultural characteristics wherein the physician and the patient fail to establish a rapport (Hyman 1970:388), the patient feels as if he/she is being ridiculed or subjected to abuse by the modern medical practitioner and they fear the impersonality and alienation of the hospital situation where death seems to be the only conceivable final outcome (Madsen 1961:20; Elliot 1972). Nonetheless, the El Tesoro inhabitants turn to a physician in times of necessity when no other effective cure has been found and they have some hope of being able to pay the fee. As Woods and Graves (1973) point out, the transition from traditional to modern medicine is apparent in almost all areas of Mexico. El Tesoro is no exception. What remains to be discussed are the mechanisms for transition and the influence of an industrial development program on the health situation of the El Tesoro urban peasantry.

REGIONAL DEVELOPMENT

Mexico has maintained a program of economic growth and development since the revolutionary ideals began to be implemented fifty years ago (LBJ Report 1982:12). As a developing nation, it is shifting from an agricultural to an industrial focus and from a rural to urban population. Mexico's policy of strong investment in manufacturing activities combined with that of promoting large scale agricultural programs whereby the small landowner receives little or no incentive has tended to emphasize the rural to urban shift. Still the rural population comprises a large sector of the populace; in 1976 it was estimated at thirty-seven percent of the total (LBJ Report 1982:17). The government expenditures in industrialization and massive agricultural cooperatives have, in effect, resulted in the neglect of the rural unemployed and underemployed (Kongas 1972:1).

In an effort to draw these people and other small, fledgling industrial sectors into the national market economy, specialized programs aimed at hitting a certain level of the population have been implemented. This population level is comprised of those who previously existed on a peasant level of subsistence but have found it increasingly difficult to do so in a structure requiring capital, technical skills and participation in the greater society (Barkin 1975:277).

Economic development is closely allied with those programs designed to improve social conditions. It is generally recognized that the Mexican health structure has focused on the urban sector and ignored many of the primary employment and subsistence problems that are such a pervasive feature of the rural poor (Canedo 1974). Within the developing nation, the prevailing theory has been that one of the products of industrialization and modernization is the transition of lower classes into the lower middle and middle classes, an upward mobility trend. Mobility may not be characterized so much by an overall increase in income but rather by enhanced opportunities for achieving certain human rights by having greater accessibility to health care facilities, the educational structure and the communication network (Sjoberg 1967).

The state of Hidalgo, Mexico, has been no exception. Indeed, in its proximity to Mexico City, it has functioned in a satellite relationship of dependence on the city further increasing economic deprivation of the area's inhabitants (Canabal and Martinez 1973). Resources are exploited, e.g., agricultural land, cement production, and are exported into the capital city with an exchange for material goods, e.g., television sets, clothing, toys, etc., that help to comprise the peasant's perception of the outside world and further siphon off his/her scarce material resources in a manner that prohibits any investment in human resources (Kongas 1972:2).

Prior to 1972, Tula's major industry was cement production. The region remains as one of the primary cement producing areas of the republic. The cement factories have had a history of upheaval and revolution concomitant with national political movement. The factories today are two distinctly different philosophically-oriented industries. Cementos Cruz Azul is a cooperative owned jointly by all of its Mexican employees. Housing, health care facilities and schooling are part of the benefit structure.

Cementos Tolteca is a British-owned firm with a strict capitalist orientation. Most of its higher administration are foreigners while Mexicans are hired to occupy lower echelon positions. Salary is higher across position at Cementos Tolteca than Cruz Azul, but the firm maintains a policy of providing housing for only upper level employees. Schooling is not provided; Mexican workers send their children to the local schools, the foreign workers send theirs to private schools. Both factories have however maintained similar employment practices wherein positions are handed down through the family and the Mexican employee network of familial kinship and compadrazgo system have provided the labor force.

As far as other industrial occupations available in Tula, in 1972 the city of Tula had 46 industrial establishments including food processing, textiles and machine repair that employed 1,000 workers. Another 1,000 were employed in the cement factories (Lazama Escalante 1977). The population of the city numbered nearly 40,000. There were only two individuals from El Tesoro employed on a permanent basis at the cement factories, in effect negating any possibility that this sector could be full-time working class participants in cement production.

The cement factories are located to the south of the city in an arid scrub region that characterizes much of the Mezquital Valley. A number of features made this zone an attractive site for the placement of a thermoelectric plant to service Mexico City and an oil refinery, the largest in Mexico to date. The area is not irrigated and was consequently largely unsuitable for agricultural purposes. There was a large, uninhabited expanse of land thereby eliminating any problems of population displacement. The Tula River flows right through the city, providing a water source. The city of Tula itself had a significant degree of unemployment and could provide the working population. Tula's proximity to Mexico City only enhanced the feasibility of the project (Lazama Escalante 1977).

A major intention of the project as with other regional development programs was to instigate industrial growth so as to improve social and economic conditions of the general populace, health being a major element (Barkin 1975). The hope was expressed that many of the chronic under and unemployed of Tula and its environs would secure jobs in the new industrial zone and contribute to an increased flow of capital in the area. Many of those persons considered as chronic under or unemployed are the residents of El Tesoro.

A similar program of industrialization to revive and revitalize the regional economy was undertaken in southern Hidalgo nearly thirty years ago. The program involved the construction of three manufacturing plants, one to build boxcars and the other two to assemble automobiles. Its goal was to create 5,000 industrial jobs and to become a magnet for attracting private industries to the area. It has since been openly declared an economic and social failure (Kongas 1972).

Another regional development program sponsored by the Mexican federal government was the Tepalcatepec Commission which had similar goals of bringing the subsistence-oriented population into the mainstream of the Mexican economy although it differed in that its primary concern was agricultural production. Methods involved the exploitation of the Tepalcatepec river basin, located in the states of Michoacan and Jalisco about 200 miles west of Mexico City, in order to make available over two and a half times more acreage suitable for cultivation. The project can be deemed successful if analyzed in terms of cost-benefit analysis in that it yielded a thirteen percent return on the government's capital investment. However, the target population, the rural poor, have not been the recipients of the increased per capita income and in fact, the project may have served to further the disparity of social and economic characteristics between the lower and upper classes (Barkin 1975).

A similar regional development program, the Chontalpa Plan, with a much greater investment on the part of the Mexican government, was undertaken to improve the agricultural production in the hot, humid region of Tabasco. It, as with the Tepalcatepec Commission, was designed to create more cultivatable land to modernize agricultural procedures while producing crops that would reap more economic benefits than the traditional subsistence crops. Again, the program was successful in terms of increased agricultural production. However, a study of nutritional status of the population undertaken prior to the inception of the project, compared to the results from a study undertaken thirteen years later, demonstrated that the peasant nutritional status remained the same as did their financial resources and position in society (Hernandez et al. 1974).

While these regional development programs outlined above differ from the Tula case in a number of ways, the similarity of approach, intent and method can be utilized to evaluate the effect of the high-technology industrialization on the conditions and patterns of the El Tesoro inhabitants. It is proposed that the industrialization and population growth of the area contributed further to cementing the broad gap of inequality between socioeconomic classes, specifically in terms of health status.

DISCUSSION

There are principally two schools of thought regarding the most effective means of enhancing a population's health status by providing an adequate diet. One is that it is necessary to have economic adjustment wherein people can afford to purchase the necessary foods (Hernandez et al. 1974). Economic adjustment implies a host of other conditions including improved housing and sanitary facilities, educational opportunities and ability to utilize medical services previously unavailable as a function of being unable to pay for them.

Economic status also implies, to a great extent, social status or an individual's position within the greater society and the resources and opportunities that characterize that position. Behm et al. (1972:14), in discussing the unsatisfactory levels of health in Latin America, express the belief that "...health is a dialectical, biological and social process which is the result of the integration of the individual and the environment influenced by the relations of production in a given society and expressed in levels of well-being and physical, mental and social efficiency". Polgar's (1962) review of the literature on health in relationship to social science studies, makes a clear case for the correlation between socioeconomic conditions and health status.

The second school of thought promoted as the best method of improving a population's nutritional and therefore health status is that of cultural education whereby the target population learns to modify its food consumption habits so as to optimize dietary status (Chavez and Ramirez 1963). While this opinion is expressed in terms of nutrition intake in their publication, it can be applied to consider the general health status. Education infers a cultural phenomenon, re-educating food habits so that they more closely resemble those prevailing that are considered to be adequate in providing the necessary nutritional components for a satisfactory diet. With respect to health practices, education signifies acculturation or changing existing habits to those utilized by the culture at better health status. Gonzales and Behar (1966) discuss the effect of education on Latino perception of good health and its requirements. They argue that, because of increased education, the Latino has come to conceive of food as a substance with nutritive qualities in varying magnitudes and characteristics. Health then, is directly related to the kinds of food one eats and how much of it. Conversely, the authors state that amongst the less acculturated indigenous population, "...food was something one ate without too much concern as long as one was healthy, but which was withheld when one became ill" (Gonzales and Behar 1966:77). In other words, the nutritive qualities of food are not recognized, only its role in maintaining a harmonious balance within the body (Gonzales and Scrimshaw 1957). This argument implies that even if accessibility to food and by inference, other health maintenance factors had no limitations, the degree of acculturation would be a principal element in determining a population's health status.

The argument seems fairly circuitous if one acknowledges that level of acculturation is virtually always highly responsive to economic status which in turn is directly related to social position. As Hernandez et al. (1974:283) note, policies aimed at improving a population's health status are more effective if they utilize both approaches of increasing socioeconomic conditions and accultural or educational directives in combination. In analyzing the development process in South Asia countries, Gunnar Myrdal (1968) stresses that health is not a factor to be considered in isolation from those other vital interacting variables of level of income, mode of living, dietary characteristics, etc. Any development program that has as one of its objectives an elevation in health conditions cannot succeed unless it takes into account the full range of interdependent factors and makes appropriate policies to deal with them in a manner best suited to optimizing health conditions.

A comprehensive, well-planned program appears not to have yet been attempted in a large-scale regional development effort, which leaves some doubt as to what would be the best approach to the matter. Indeed, the preponderance of failures in regional development schemes in terms of minimizing economic, social and political inequalities serves to illustrate the singular focus that many of these projects had. With regard to the industrialization of the Tula de Allende economy and its objective of integrating the populace into a sophisticated and profitable technologically-oriented society with concomitant social and human right benefits, it is useful to discuss the failings of one of these projects in order to evaluate the Tula effort and its effect on the El Tesoro population.

The Chontalpa Plan, as mentioned previously, was a key regional development program initiated in 1958 (Hernandez et al. 1974). The program was designed to improve the agricultural production of one of Mexico's most tropical areas. Although the approach was purely economical, it was assumed that the economic benefits would result in a number of other benefits, including an improvement in health conditions, particularly nutritional status.

It was well recognized that the area was characterized by a system of economic and social inequality, much as is the rest of the nation (LBJ Report 1982). Laborers who worked in agricultural production and self-subsisting peasants were on the low end of the scale. Even amidst a rich, fertile agricultural zone, they were accustomed to suffering from the stresses of poverty including malnutrition and sickness. In order to evaluate the effectiveness of the development program in terms of integrating the poor into the economic system and reaping its benefits, dietetic and clinical analyses were undertaken in two different communities. One analysis was conducted prior to the initiation of the program. A follow-up study was done thirteen years later, providing a reliable gauge of evaluating nutritional change as a result of development.

Results showed population had increased as a consequence of immigration in search of greater job opportunities, a depressed death rate and an increased birth rate. There was an apparent greater availability of food, which was attributed to the permanent rise in population. A Health Center had been established and there was a drop in the incidence and severity of the sanitation-related diseases such as diarrhea and parasites. More schools and businesses to serve the increased number and varied needs of the populations were established. Educational levels were greatly improved and greater consumption of capital goods was in marked evidence. Living conditions, generally, were improved with the implementation of electricity, financial access to better construction materials and community resources to take care of such hygiene-threatening conditions as a stagnant swamp.

While the above improvements seem to make for a picture of overwhelming success, a closer examination of dietary patterns reveals that changes in nutritional status wherein overall food consumption increased, as well as riboflavin and vitamin A content were restricted to a certain segment of the population. Those persons who had displayed unsatisfactory nutrition levels prior to the project's inception continued to do so. These persons comprised nearly one-third of the total population and were, of course, not the immigrants who came to work on the project having the considerable skills to do so or the merchants and other professionals who serviced the needs of a growing population. Instead, they were those who had originally been the most economically and socially disadvantaged. The gap of inequality, instead of merging closer together, had spread even further.

Hernandez et al. (1974:290) do not attempt to isolate a singular causal factor, but instead raise three questions as to why the economically and socially deprived remained in the shadow of a regional economic development program. The three questions are: 1) Does the population sector not know how to take advantage of development? 2) Were they denied any per capita increase as a result of the expanded demographic base? 3) Were they prevented from any participation in the development scheme? The authors agree that the most likely explanation is a combination of all three factors.

There is a distinct parallelism of contributing factors to the El Tesoro situation. Certainly, the demographic base expanded considerably with a jump from nearly 40,000 in 1972 to 60,000 in 1980. The installation and operation of two highly sophisticated industries required a large number of skilled workers. The majority immigrated from other places, e.g., Veracruz, where they had gained previous working experience. Even those positions that required no specifically trained skills were in construction and involved use of heavy machinery and equipment. The vast majority of the peasant population, by virtue of education and class association, have had no similar work experience or even accessibility to it. Consequently, El Tesoro residents lost any opportunity of obtaining employment in either the PEMEX refinery or the thermoelectric plant to a newly immigrated populace that had the necessary skills and experience.

In accordance with Mexico's official organization of a health care delivery system, a clinic was built in Tula and staffed by PEMEX to serve the employees of the federally owned and operated refinery. Other health facilities already established in Tula included a hospital run under the auspices of the Institute of Social Security, a privately owned clinic used primarily for childbirth as well as three or four private physicians. To meet the demands of a larger population, a number of other physicians have established practices as have private clinics and pharmacies. Certainly, these services and an increase in general per capita income have aided to improve health conditions for the general population of Tula. However, the residents of El Tesoro, because of their unemployability, are not covered by any means of social security and therefore are not eligible to be treated at any of these facilities. Plus, a low cash income prohibits them from utilizing private services in anything other but emergency circumstances.

Ostensibly, any Mexican not covered by Social Security in some way is eligible to receive health care benefits from the Ministry of Health Assistance which is responsible for nearly eighty percent of the population (LBJ Report 1982:54). Although it is responsible for the majority of the nation's population, in reality the Ministry of Health cannot realistically provide adequate services as its resources are severely limited through a maldistribution of medical personnel, equipment and funding. In an analysis of the development progress in Mexico and its results in health, the University of Texas Lyndon B. Johnson School of Public Affairs Report to the Agency for International Development, gave the estimate that nearly one-third of the Mexican population cannot, through inaccessibility or ineligibility or cultural barriers, receive health care benefits from any government health organization or private physicians (LBJ Report 1982:59).

Even though the El Tesoro inhabitants are in the midst of a rapidly urbanizing setting marked by a high technology-oriented economic system, they are still barred from entering the system and becoming recipients of badly needed social services and benefits. Consequently, while such projects as improving water sanitation or instituting schoolwide innoculation programs may be undertaken as a by-product of community-wide urbanization, the population sector, most at risk because of the nutritional status and least able to receive full advantage of these programs, remains in the semi-isolated position that they were in prior to industrialization. In comparison, the gap becomes even more demarcated and the pervasive strain of inequality becomes more mired in the financial, social and political development of the city.

A decrease in infant mortality rates, while significant in its own right, does not proclaim a population's emergence from one beset by primary health care problems to one characterized by the chronic disease sufferers of a well-fed developed nation's population. The failure of fertility and malnutrition rates to drop indicate a lack of the dissolution of the strong basis of inequality that is so important in determining level of education, employment opportunities, chance for social mobility and health features (Teller et al. 1979).

In addition, the strength of cultural beliefs with respect to appropriateness of patterns of health care utilization and dietary characteristics is an elemental factor in a population's health status and is intrinsically related to social and economic levels. As Benyouseff and Wessen (1974:301) demonstrate, poverty can be a deterrent to the utilization of health services in at least four ways: 1) inadequate financial resources to pay for services rendered and/or medication plus transportation fees and other costs incurred while visiting the physician or health care facility; 2) social factors that prohibit the individual from feeling comfortable in seeking institutionalized health care or that deem the utilization appropriate; 3) logistic barriers wherein facilities are just not accessible and; 4) attitudinal factors wherein an individual's conception of his/her health and the factors that are related to it do not allow him/her the ability to utilize health care facilities and/or services.

Gould (1960, 1965) discusses the implications of technological change in the utilization of Western health systems and the medical beliefs of a village in northern India. Much of his discussion revolves around the peasant's flexibility in adapting to certain features of the "new medicine" while maintaining many of the features of the folk or "village medicine." A principal issue raised is the direct relationship between economic abundance and the tendency to resort to Western medicine. Those deterrents described by Benyouseff and Wessen (1974) are entirely fitting in this Indian case as in the El Tesoro situation. Flexibility is often a function of economic adaptability and mobility wherein educational levels, exposure to modernized system or urbanization and technological capabilities are all contributing factors. While industrialization proceeds, as in the introduction of the refinery and the thermoelectric plant in Tula, it is apparent that a number of cultural characteristics are related to health change. For example, diversity of foods consumed and variety of the methods of preparation increase as a result of urbanization (Chassy et al. 1967). So, too does acceptance of modern medical techniques (Wolff 1965). However, the dominating principle, as demonstrated by the failure of the regional economic development programs, in integrating the peasant into the economic mainstream and consequently elevating the conditions that are related to health, is the denial of what the peasant actually is in relation to the larger society. The relationship is historically and presently largely determined by economic factors and the whole social realm of resource availability and utilization that is intrinsically tied to the economic foundations.

CONCLUSION

There are numerous published arguments on health improvement programs and their effectiveness. The main theme appears to be in pointing out how and where they fail. Sai (1963:213) states that the fundamental problem in improving health and nutrition standards in developing countries is the inadequacy of human resources. He makes a plea for aid to be given by developed nations to those less developed. Conversely, Brown (1966) cites a common failure to be the propensity for importing inappropriate Western medical models replete with highly specialized and expensive procedures, facilities and methods. The author decries such an approach and cautions that the process of health is a long and arduous one. Taylor and Hall (1967) delve into the complexities of the problem, noting that there is no problem in international health as important or as poorly understood as the finely woven interrelationship between health, population growth and economic growth. These interrelating factors are often ignored in the formulation of development programs in favor of focusing on increased production, utilizing the economic premise that elevated cash incomes will generate better health/nutritional conditions (Fleuret and Fleuret 1980).

It is all too apparent, both in the published literature and in observation of such cases as El Tesoro, that the peasant population, the group most susceptible to poor health conditions, has received very little benefit from the industrialization/modernization processes that held as their aim an integration of the disadvantaged sector into the mainstream of the economy. Thiesenhusen (1980:129) states, "...what is important in the economic pattern that has emerged is that in Latin America today there is still little upward mobility in the system, if by that is meant opportunity for those at the bottom of the socioeconomic structure to rise to responsible positions in strata above them. And because of the astounding rate of population growth since World War II there are probably more poor and illiterate in Latin America now than at mid-century." The population under examination here only supports such dire forecasting. The impact of the introduction of two high-technology oriented industries into the area has only resulted in a further disparity of inequality between the social classes of Tula, Hidalgo. El Tesoro residents have not been assimilated into the economic system and have not been able to improve health conditions through accessibility to health care services, greater financial resources or significant improvements in environmental conditions. Perhaps most disheartening is that they have become more aware of the modern system of medical care and the benefits it can have, but yet are resigned to having little accessibility to it.

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INFORMATION TECHNOLOGY: THE CASE OF THE MICROCOMPUTER IN THE THIRD WORLD. COLONIAL PLOT OR APPROPRIATE TECHNOLOGY?

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The issue of economic and cultural dependency as a result of the transfer of new technologies from the developed to the developing world is an old and much discussed one. Central to the arguments on both sides is the idea that the complex technology developed in the North countries creates more difficulties than solutions for the South countries that adopt it. The opposite tenet deals with the need to make capital intensive research available to the Third World nations in the form of new products of potential benefit to their growth and development. The answer most often posited is one which throws the responsibility of the country in question, i.e. let the locals decide what is really good for them. In much the same spirit of generating community participation in many social welfare interventions, this method is only as good as the community of host country experts that are recruited to approve or disapprove the introduction of the new technology. Unfortunately, no judge, jury or other absolute standard exists to help adjudicate the selective impact of different technologies. Our focus in this article is directed towards developing a conceptual framework and suggesting a methodology by which such an evaluation can be carried out. The technology in question is the microcomputer, which meets the criteria of capital intensive technology.

Due to the relatively recent arrival of the microcomputer in the developing world and to certain inherent difficulties with the evaluation of technology diffusion, the observations that we present are currently limited to case studying. Several authors have commented on the case study as an appropriate methodology for the evaluation of new technologies, since the controlled observation of larger random samples is difficult and appropriate observational methodologies are lacking (Rice 1984; Johnston 1984). Rogers (1983) observed that only three percent of innovation/diffusion research reports reviewed were concerned with the consequences of innovation and attributed the small amount of impact oriented studies to three issues:

1. That diffusion/innovation research funding agencies had a vested interest in promoting the innovation with little concern for the impact.

2. That normal survey techniques were inappropriate for measuring consequences of interventions.

3. That consequences per se are difficult to measure as opposed to a rate of innovation (pp. 378-379).

If these observations hold for all of innovation/diffusion research, they are particularly true in the case of the microcomputer with only a few years of experience in the developing countries to guide us.

THE MICROCOMPUTER'S POTENTIAL

As the nations of the world become more economically interdependent the need for technology to generate, analyze, and communicate information of all sorts is more critical.

For less developed nations the problem of data analysis and information processing has always been crucial. Even the most basic fiscal and personnel data needed for the management of the nation state is not available. In more advanced developing nations complex data management tasks such as national census or survey activities have been a virtual impossibility without massive technical and economic assistance.

The advent of the large and costly computer allowed some of the more wealthy institutions in the developing world to purchase and to use information processing equipment with the attendant problems of high-priced maintenance and personnel that went along with it. With the appearance of the microcomputer the problems of initial cost and the issue of training and maintenance have begun to take a back seat to the perceived value of these machines in the developing world. The first benefits were obvious in the area of financial and project management (Ingle, Berge, and Hamilton 1985). Here the routine jobs of accounting, project planning and management were greatly facilitated by having low cost and accessible information processing power. Another documented impact of microcomputer technology in the Third World has been in the design and execution of various kinds of studies and surveys (Bertrand 1985).

While the research, development, and management functions of the technology seem to have an important place in overall assessment of the utility of the microcomputer in the Third World, there are new applications which hold even greater promise. In the area of education the combination of microcomputer technology and optical disks promise to make massive amounts of information available to any user at very low costs. Interactive software combined with video has the potential to make certain training functions very inexpensive. Software for the diagnosis of routine medical problems by paraprofessionals is available and will soon be tested (Auvert et al. 1986). The list of potential applications is enormous and advocates of this new technology are enthusiastic about the transfer of capital and technology from the First to the Third World nations.

While the author must count himself among the proponents of this spread of technology, it is time to take a slightly more aseptic view of its potential and to lay the groundwork for user oriented evaluation of its impact. If such an evaluation proves to be negative, then these negative implications and findings need to be known before major investments are made. Given the recent collapse of the consumer microcomputer market in the developed countries and their tradition of dumping overproduction in the poor nations, the possible risk of unwise investments is particularly great at the current time.

THE CONCEPTUAL FRAMEWORK

The nature of the spread of technology--including tractors, drugs, managerial systems, etc.--has been a much documented and researched question over the years. Most of that research has been directed towards the study of how new technologies are adopted and to what extent they improve the quality of life or productivity (Rogers 1983). With respect to the developing world there are two traditions of looking at the transfer of technology. One mirrors the more classical developed national approach of innovation adoption focusing on the characteristics of individuals and societies as they adopt new technology, and, as a second order activity, the impact of the innovation itself. The second approach is a more politicized position which holds that the transfer of technology, particularly high tech items, is simply a sophisticated form of colonialism and that developing countries should avoid it at all costs. While this position and its many variants has a certain face validity, there is little evidence to suggest that many countries use it to guide policy. There is much more evidence to suggest that developed countries may not make their most advanced technology available to the developing world for a variety of reasons. The kindest interpretation of this trend may be the enlightened self-interest approach which Europe has increasingly adopted. For the purpose of our presentation here we assume that any model involving multinational business and the transfer of technology from capitalist or socialist North nations to the South will be at best under the terms of enlightened self interest. This by definition puts the South countries at a disadvantage because of their lack of capital resources, a particular problem in the production and utilization of microelectronic and information technology.

The idea of treating information and information processing equipment as a new technology does not constitute an innovative approach to the study of the developing world (Soedjatmoko 1985). There have been many discussions of both the positive and negative implications of communication technology in general, and recently these discussions have drifted over to the world of microcomputers and their spread to developing countries (Darrow and Saxenian 1985). What is still missing is a set of models and methodologies to evaluate the impact of information technologies of which the microcomputer is but one case.

The value statement which best reflects our starting point is taken from Soedjatmoko (1985). He refers to development as a process "...Which is essentially a learning process. ...which succeeds when a society as a whole at all levels learns to make optimal use of its resources through the application of science and technology towards improving the daily lives of its citizens in ways that are consonant with their basic values and aspirations" (p. 16). The microcomputer is an appropriate technology therefore, if its use improves the daily lives of Third World citizens, according to their own criteria, and with a minimum of unintended consequences. The net effect should be a positive one but we must be particulary careful as potential evaluators in guarding the idea of cultural relativism as we consider unanticipated consequences from a given innovation (Goss 1979). Without getting into the morass of defining a global quality of life indicator, it is acceptable to look at health and health service delivery as our point of departure. There are massive differences between the North and South countries in terms of objective measures of morbidity and mortality. The solutions to many of the problems are known but the resources are not available to deliver services or care. If we can see a major positive impact in the health sector, it is at least a working argument for other interventions involving the microcomputer. While the ultimate impact should be on morbidity and mortality there are several health intervention strategies where requests are well enough known in the short term so that we can assume that effective process indicators will be translated into impact.

Thus a general model posited for an evaluation of the impact of microcomputers on productivity of the health sector in a given country would look like the following model.

INDIVIDUAL AND INSTITUTIONAL CASE STUDIES: REASONS FOR OPTIMISM

As we have indicated earlier, the general observations of a case study presented by the proponents of an innovation tend to focus on the positive side of the adoption and of its impact. The case studies that we present here are certainly in that category. While they are notable for their preliminary success we also observe the possibility for a number of points of conflict and of potential negative effects.

An evaluation which shows greater than expected negative results might cause the leaders of certain developing nations to reconsider carefully increased adoption and use of the new technology. While there are few indications that this is happening with the introduction of the microcomputer, the potential for positive or negative results is sufficiently high that we should begin to consider the framework and methodology needed to measure it. The following individual and institutional case studies are intended to provide the qualitative framework for the formalization of an objective evaluation design.

As per Figure 1 there are at least two levels where the microcomputer, as an information technology, can be important in increasing productivity. The first is at the individual level where capital intensively trained professionals are often trapped by resource and bureaucratic constraints, unable to effectively use their advanced training. At this individual level the established correlates of education, socioeconomic status and individual modernity, or to use Roger's term, cosmopoliteness, are predictive of who first adopts the microcomputer whatever the impact of this adoption might be.

Our first case is at this individual level. It is the case of a young medical professional returning to the ministry of health of a Central African country after

FIGURE 1
Evaluation Model of Impact of Microcomputer in Health Sector in Developing Countries

Different Areas of Application	Correlates of Innovativeness in Use of Micro-Computer in the Health Field (Independent Variables)	Intervening Variable (Old Dependent Variable)	Consequences of Innovations (New Dependent Variable)
- Health Planning, Surveillance	- Individual	- Speed of Adoption of Microcomputer Technology	- Functional, Direct, or Manifest Consequences
	1. Education		1. Increased production or effectiveness
	2. Socioeconomic status		
- Hospital Administration	3. Cosmopoliteness &		2. Higher incomes
- Family Planning			3. More leisure
- Nutrition, Primary Health Care			4. Improved quality of life
- Vaccination Control	- Institutional		- Dysfunctional, Indirect or Latent Consequences
- Vector Control	1. Communication channels Open		
- Environmental Health	2. Relationship to power base		1. Greater expense
	3. Information intense nature of output		2. Need for more capital
	4. Others		3. Less equitable distribution of income, or other resources
			4. Concentration of power

Adopted from Rogers (1938:376)

obtaining a Master's degree in the United States. While in the States, he was trained in mainframe computer methods and felt for a number of reasons that such was inappropriate technology for his country. This was in the early 1980's. Upon returning to his country he found, like many capable energetic professionals, that with no support staff and no equipment to work with, he was spending most of his time doing trivial administrative tasks. When he did have the opportunity to put his analytical powers to work, the quality and quantity of the data available was so poor that he lost confidence in the results. Furthermore, his colleagues felt that he was bringing foreign ideas back to his home country. Since the methods and techniques he had learned were to a certain extent technology and data oriented, and these technologies were not available in the local environment, the critiques directed toward him were somewhat justified.

In 1985 through the auspices of an internationally financed project in primary health care a microcomputer with attendant software was made available to the young professional. Given the similarity of the new equipment with what he had been trained on, he immediately picked up the essentials of how to work with the machine and began to use it to assist in the routine technical tasks associated with his job. These tasks included simple word processing, financial reporting and budget development using spreadsheets. He reported that the initial increase in productivity created a certain amount of resentment in some of his colleagues who felt he was making them look bad.

At the end of several months another project provided equipment to put in place within the Ministry of Health. Moving into the area of management he began to develop a number of data bases that were important to the country's health sector activities. Shortly he developed around this single microcomputer the first complete census of health personnel in the country since independence. This major task was undertaken and completed without special financial resources and in a record period of time. While at the time of the interview this process of microcomputerization of the young professional's activity had only been going on for a period of eighteen months, his prior skepticism about the utility of computing equipment in the Third World had completely vanished. He felt that due to the presence of the microcomputer he had personally been able to make a difference in the activities of his unit. By virtue of his ability to provide needed information to his superiors for planning and budgeting he thought that his own career and job satisfaction had been improved. By the same token many of his critical colleagues seemed to accept the explanation that he had been aided by a machine and felt less threatened than if the young professional or some expatriate team had achieved such accomplishments without the help of what they perceived to be an impersonal machine.

By decreasing the time and cost of data collection and processing at the Ministry of Health and by providing needed data for the planning and execution of national programs it became clear to a number of observers that the marginal extra cost of four to five thousand dollars had vastly increased the productivity of a single professional who already represented the investment of 45 plus thousand dollars for his master's degree and an unknown but significant amount for his medical training. In the short term he was unable to identify any negative aspects of the technology intervention with the possible exception of the normal dangers of becoming visible in a bureaucracy, and suffering the attacks of those whose turf was threatened. How much of this professional's performance is due to his special case or to personal characteristics is of course impossible to ascertain at this moment. It is equally uncertain as to the longer-term effects of what he is doing and whether these effects will continue to be evaluated as positive. The immediate results however, are positive enough to suggest that an experimental trial be set up where a certain number of young professionals in developing countries be given access to microcomputing equipment and training, and their performance compared with that of their colleagues who do not have such access. The hypotheses would be that their productivity would be increased to such an extent that this would be one of the most cost productive interventions possible in terms of providing the equivalent of more highly trained personnel to the developing countries.

DEVELOPING A NATIONAL HEALTH PLANNING MODEL

The first case served to emphasize the more traditional benefits of introducing microcomputers into an individual level information intensive environment, i.e. relying on greatly increased data processing speed and capability. There is another similar set of economics which are best illustrated by a second example. In this case the microcomputer was used as the catalyst for the introduction of a planning cell at the Ministry of Health and Human Affairs in the Sahel, one of the lower income areas in the world. When the microcomputer was first suggested as a possible tool to be utilized within the Ministry, there was almost universal opposition there. The technology was considered to be too sophisticated, complex, and difficult to maintain in the harsh desert environment to be helpful in the context of a resource poor ministry.

The proponents of the use of microcomputers argued that it was precisely due to the lack of resources available to the Ministry that it was imperative that the best decisions possible be made regarding the allocation of scarce resources. The results in the first eighteen months of project activity have been major and again almost completely positive.

The first step in understanding what to develop into an information system for the microcomputer is the information audit. This is the design activity that occurs prior to making decisions about what should be programmed into the computer. When this information audit was conducted at the Ministry of Health there were a number of rather startling findings. There was no full listing of personnel currently employed by the Ministry, nor was an inventory of capital equipment, such as vehicles, available. The reason inadequate records were kept was a lack of resources and manpower necessary to maintain them. However, the potential for waste and mismanagement due to the lack of up-to-date knowledge was enormous.

As a part of the information audit, an inventory of forms currently utilized in the collection of data in the field was developed. This listing indicated that over 100 different pieces of paper were being filled out at some stage in the public health service system. The result of the proliferation of paper was that an extraordinary amount of duplication was taking place. In addition, it was estimated that up to 40% of the time of primary health care personnel was spent filling out forms.

Another similar problem was that the information collected on the numerous forms at all levels of the Ministry was not utilized in an efficient manner. The major difficulty was the lag time between the collection of data and its being consolidated and presented to anyone who might have access to resources needed to bring about some action. This was particularly evident in the telex/cable based epidemic reporting system in the Ministry where the information arrived to central collection points in a rather timely fashion, but was never collated quickly enough in order to make decisions regarding the presence or absence of an epidemic. When this system was finally put into a simple base on the microcomputer it was discovered that an epidemic had been underway during the last few months but due to the slow processing of data no one had noticed in time to take any corrective action.

The example cited represents a rather classic situation which might be considered typical of traditional approaches to a series of problems for which information is collected and needs to be utilized. The necessity of organizing and systematizing information required for efficient use of the microcomputer can itself be the basis for major reforms within a ministry. For example, the simple step of the enumeration of the number and type of different data collection instruments and forms used by the primary health care system provided an important tool for rationalizing a data based management program. If such demands can be installed as part of the impersonal and supposedly objective requirements of computerizing and updating an information system, then so much the better.

It was the need to analyze and organize the types and quantity of data to be introduced into a computerized system which first produced positive results in the institutional structure of the Ministry of Health. These positive results were initiated by a demand for more information: firstly in the area of record keeping for personnel management, secondly to develop logistic control, and finally, to process quickly within the Ministry special study data.

One of the first requirement for institutional planning is a sound idea of the resources actually under the control of decision makers. Therefore, when the initial information audit revealed that the Ministry of Health did not have a complete listing of its own personnel and equipment it was decided to prepare a list as a prerequisite for developing an action plan. Two data bases were designed, developed, and ultimately put into service on the microcomputers. One of these listed and tracked personnel in the Ministry and the other did the same with the Ministry transport system. Both of these applications were developed in a second order data base manager, Knowledgeman, and were immediately put into service by the Ministry of Health personnel. Report began to be generated on a regular basis for the consumption of higher level officials with positive results. The Secretary General of the Ministry saw the advantage of having this data available at his fingertips. He had the planning cell, where all of the microcomputer based data processing had taken place, put under the direct control of his office. This was an important step for the project which was designed to develop a planning and management capacity for the Ministry. Planning information was then available at the highest level of routine decision making. Expatriate project personnel began to be consulted as to the type of information that should be utilized; and the image of the planning cell improved within the institution. It should be noted at this point that the initial activity cited here has been due to the presence of an expatriate project team brought in with the explicit purpose of introducing microcomputer driven planning. The argument can be made that only with this capital intensive push could such a thing happen and that it will fall apart as soon as the expatriates leave. While this is an empirical question which can only really be answered with time and observations, there are some indication that the local staff are completely able to use and manage the equipment. The time logged by local professionals on the microcomputers has increased considerable and their enthusiasm for training and further exposure to the equipment has improved as they see the applications being developed.

The second function of the microcomputer in this environment, which added as much or more to the overall institutionalization of information based planning, was in the domain of data processing for small surveys. The traditional approach, before the advent of the microcomputer, was that a census or a study would be introduced and data collected by field teams. At this point the physical information in the form of completed questionnaires or sometimes encoded data would be taken to a mainframe computer where the data was analyzed, written up and brought back to the Ministry in the form of a report. In the smallest and poorest of countries this took place outside the nation's boundaries while in the larger countries at the Census Bureau or National Finance Ministry where there was usually a computer with available data processing. As a result, data was almost always delayed for these special studies which generally had a very poor reputation except as academic exercises.

Two examples from this country case proved the exception to this rule and provided further evidence of the utility of microcomputers. The first involved a prestigious United States based agency which conducted a nationwide nutritional surveillance survey with the express purpose of testing if drought conditions prevalent in the country at the time were antecedent to the declaration of a nutritional emergency. The data for this survey were returned to the United States for processing and due to competing priorities, were not returned in report form for several months. The Minister of Health in the meantime received numerous requests regarding the data and as the presence of a famine became more obvious, he began to ask the internal Ministry of Health microcomputer staff if something could be done. A report was finished in less than two weeks and the results presented in preliminary form to the Minister. This was accomplished by utilizing the combination of software made available for nutritional standard calculation by the Centers for Disease Control in the United States and commercially available statistical processing packages. The Minister's pride at having the ability to do this within his own organization combined with a real need for the information resulted in a very positive evaluation as to the importance of the microcomputer in the organization.

A second example of the same nature involved the execution of a national morbidity and mortality survey for the Minister as the first national effort to establish some base line parameters for progress in improving health. This is always a major data collecting exercise involving survey work over a large geographic area and later the analysis of data in a timely and appropriate manner. While many of these studies had been undertaken in more advanced developing countries very few had produced results in less than eighteen months from survey start and some required longer periods before a final analysis was available. The study cited here was in and out of the field and had prepared a preliminary report which was subsequently accepted and distributed by the Ministry in less than six months. Data processing was managed on hard disk equipped microcomputers and resulted in some major changes in Ministry policy almost immediately.

The reinforcement provided by the two related small study examples cited began to move the Ministry of Health towards accepting the technology and the idea of using microcomputers as the basis for decision making within the institution. Within eighteen months the environment had changed from one where the use of microcomputers was considered too complicated a technology, to one where the Minister was interested in having access to his own microcomputer for information management within his office. The technology had clearly served as a tool by which it became the timely use of data for decision making within the environment of the Ministry.

The introduction of computerized data processing in the environment of an information poor Ministry of Public Health served to stimulate the demand for more information. It also provided a catalyst for a more systematic approach to the organization of data within the Ministry. There are, however, some less than desirable attributes to this particular blending process which need to be mentioned. The control of information in any formal organization is often perceived to be tantamount to the control of power. It is, therefore, quite logical that when information is made more accessible, some middle and top level managers feel threatened. This was the case in this experience and some care should be taken to ameliorate and work through this problem. By the same token there are some people who are truly computerphobic and one encounters real blocks in the attempt to train these individuals. While our own experience is that it is possible to overcome this problem, in most cases it will create stresses in the functioning of the new system.

The presence of expatriate trainers or change agents in this environment has the effect of exacerbating some of these problems and making others less difficult. For example, fears about what will be done with collected information are compounded with expatriates in charge. However, training is usually easier to accept from individuals who are not personally involved in the work place dynamics and this includes expatriates. On the balance, however, the above problems are inherent in any change oriented process and the introduction of microcomputer driven information systems is only a slightly more exaggerated example of the generic case.

As both of these case studies indicate it is possible to see major improvements in process by the introduction of a microcomputer. While these are admittedly examples that were notable for their success, and there are undoubtedly many computers lying unused in offices in the Third World, the major questions to be addressed on the issue are the following: 1) Are the benefits from this technology greater than the possible costs? and 2) How might one go about maximizing that difference?

INDICATORS FOR INSTITUTIONAL AND INDIVIDUAL MEASUREMENT OF MICROCOMPUTER IMPACT ON PRODUCTIVITY

This next stage in developing our evaluative framework involves specification of indicators and an evaluation methodology. Since most of the indicators are generic enough to be used in both institutional and individual situations it is these more general guidelines that we first present.

There are few, if any, circumstances in which microcomputer based information systems have been installed for over a two-year period, making long-term evaluations impossible at this time. The measures that we suggest here will make possible such long-term impact studies, as the time and experience related to applications increases.

While the criteria of indicators are relatively well established, some creativity needs to be exercised in developing new non-obtrusive measures of the technology's impact. We would suggest the following as a start in that direction:

1. Amount of time saved in processing routinely collected information.

   Time is the oldest and perhaps the best indicator of improved performance. If one can do the same or a better job in a decreased period of time it is almost always a positive event. Here we would need to list all prior routinely collected data and classify it as to the time required to process and compile information, both before and after the introduction of the microcomputer based information system.

2. Amount of time saved in processing special studies.

   This is a subset of the above and would be treated in the same manner. Special studies are a part of every large organization and the time needed to process them is critical to their utility. Take a sample of special studies before and after the installation of a microcomputer capability. Compare the time required from project inception to final report production.

3. Increase in number of requests for information from data sources.

   An indicator for data from the statistical or information processing unit. The number of requests could be monitored before and after the introduction of the microcomputer activity.

4. Increase in the number of decisions that can be traced to data generated by the new system.

   As 4) increases, 5) should increase as well. The methodology used would require tracking the individual requesting the data, and following up several months (4-6) later to discover if a decision resulted from the use of the information.

5. Increase in the level of support due to the ability to present well organized and up to date information.

   This may be better placed in the long-term category, however, because it refers to a budget increase for the data processing unit in order to meet demand. This is easily quantifiable and obtainable before and after the introduction of the microcomputer.

6. Increase in use of microcomputers to analyze and process data at all levels of an institution.

   Again a simple log system would show the amount of time used by each unit or individual requesting service. The time should go up and could then be used as a correlate of change which might take place in the sub unit.

The elements of the above could be incorporated in an encounter sheet for the use of information services. This sheet would identify: the initiating person and department of the request, the type of request, if the request is related to routinely collected data or to a special study, the type of output requested, the person processing the data within the unit, the amount of time required to process it, what level of analysis was required, what level of presentation was required and other identifying data using data, time, or other criteria. It would also be useful to note the background characteristics of the individual requesting the information such as position, age, education and in particular if the individual had been exposed to prior information-related or microcomputer training, so that we can assess at what level the addition of microcomputers provides the benefit.

In general, the increase in the amount of information available to make a given decision will improve the quality of that decision. If the decision maker has received very advanced training, then by improving his/her personal productivity you have increased the potential for action. Health in the developing world is one of the areas where capital intensive professionals are used in many administrative tasks without sufficient logistic support. It is therefore reasonable to suspect that if use of the microcomputer can improve the productivity of these professionals or make the task such that a lower level person can do it with equal proficiency, then other parameters for positive evaluation have been set. Here we might suggest the following kinds of individual level observations.

There has been little research on the role of the individual professional in a resource scarce environment. Many well trained individuals upon returning to their country move into higher levels of administration fairly quickly. Since they often lack the support structure needed to effectively apply their skills to problems solving they represent an optimal target for the introduction of the microcomputer. The whole philosophy of putting the computer's power at the service of the individual is consistent with the concept of drastically increasing productivity among that group of individuals that represent a truly scarce resource for many developing countries. In order to adequately measure this productivity certain of the parameters set earlier for institutions obviously apply. Time savings noted in accomplishing routine tasks may be more important to the highly trained professional or technician in terms of making more of his/her specialized skill available to the employer organization. In the areas of scientific and social research the microcomputer may make productivity possible for the first time at all levels for certain individuals. This would be translated into the improved quantity and quality of research, particularly applied and operational, and would also produce more requests for data.

Other individual parameters are important to monitor. Clearly the cost of equipment and training and its relation to our hypothesized productivity increase need to be considered. While in theory the proliferation of microcomputer equipment should result in a greater and more open use and availability of information the potential for the reverse to happen is present. Will certain individuals take advantage of the availability of information processing power to try to control bureaucratic resources?

Finally, at the individual level we are confronted with the confounding elements of individual innovation and adoption of new technology. Here the literature is clear that the characteristics of the first round of adopters are quite different from those of later users of the same technology. In designing our interventions and experiments this factor needs to be controlled in order to measure the technology's impact.

OTHER DESIGN CONSIDERATIONS

While the full development of study protocols goes beyond the purposes of this paper the direction should be clear. Process or so-called formative evaluation needs to move forward at both the organizational and the institutional levels. The designs suggested are of a longitudinal nature based upon organizational management information systems for institutions and formal organizations. Here indicators such as those suggested would be monitored before the introduction of the technology and then at several points during the life cycle of the technology introduction. Since the indicators are general measures of organizational efficiency it is appropriate to include them as part of a more generalized management audit activity. As the number of observations increases, with time there should be data sufficient to judge the utility of the intervention. Less easy to measure will be the possible negative effects of microcomputer introduction. Perhaps external observers should be used to periodically review different organization and individual changes presumed to be caused by the introduction of the new technology.

With individual process improvements we are conceptually closer to impact evaluation. Here the impact of increased investment in training, etc., is measured by the improvement in productivity in the organization. More classic summative quasi-experimental designs would seem also appropriate here. A group of individuals could be chosen at random at different levels of the Ministry and randomly assigned to groups given or not given access to microcomputers. Observations would be generated by the monitoring of normal management information and individual measures of productivity. Summaries of productivity would then be kept and compared between the control and experimental group at pre-established periods. Once these measures of process are established, it should then be possible to move to the next stage of evaluation, that of evaluating the impact on the populations served of improved information systems driven by the microcomputer. Impact evaluations would be based on the objectives of the organization served by the microcomputer system. In the case of health ministries this would be an increased rate of improvement in vital health indices for the population.

Measurement of impact is the point of marriage between the management information system and the highly complex models and information needed to evaluate the impact of these interventions. Using the health field as an example, we find that it is true that general solutions to most public health problems in developing countries are known at the individual level (i.e., vaccine preventable diseases are controlled with vaccination programs). Yet, there have been millions of dollars spent without much result in an attempt to delineate the relative impact of competitive interventions (i.e., does an agricultural intervention improve nutritional status faster than a family planning program?). This is due primarily to the tremendous complexity of the models that, at the societal level, affect health status and the quality of life.

Most of the traditional experimental models utilized to date in impact evaluations of health and social service interventions have, therefore, resulted in inconclusive results or often no results that can be attributed directly to the intervention. The exceptions to this rule are those interventions, such as vaccination programs, where the physical event, if properly carried out, has an immediate and irreversible effect. Yet, it could be argued that the inability to public health researchers to attribute specific positive impacts to given programs may be as much due to problems with field methodology and design issues as with the programs themselves.

The microcomputer appears to have the raw information processing ability to allow us to do in this area of human enterprise what the microscope did for the biologist. It may offer the capacity to collect enough information which would allow us to see, in the statistical sense, how the conglomerate of variables that affects human quality of life will behave, for what may be the first time. This will be accomplished through an increase in the number of observations and an increase in the standardization of field methods. The microcomputer both limits the introduction of variance into our models and gives us the added power of greatly increased observations for causal analysis. The result of this combination of events will be twofold. First, a better and more timely measurement of the impact of new interventions and technologies. If this comes to pass then there should be a correspondingly great improvement in the real amount of resources devoted to actual service delivery and resultant changes in positive impact on the population. This change in formulating and developing strategies for the utilization of scarce resources in an environment where the per capita resources available for health and social services show signs of decreasing could create conditions for a major injection of resources. This possibility, at the very least, must be closely evaluated and studied on a pilot basis to understand better its potential impact.

In a world which shows no signs of making vast resources available for improvement in the quality of life of a major part of the world's population, the possibility of greater efficiencies is one that must be pursued. As mentioned earlier, there is a decided positive bias to our presentation here because we have observed the potential of this technology as it has helped to solve problems in the Third World. Questions regarding if such equipment can be made to function under harsh environmental circumstances and if sufficient number of persons can be found to be trained are not covered here since we believe the answers based upon our experience to be positive. What needs to happen at this point is that others should analyze, critique and develop hard evaluative frameworks. We present these current thoughts only as broad guidelines.

The application of information technology to the problems of development needs to be quickly evaluated with direct reference to the needs of the developing world. If we are able to do this quickly and objectively the potential for increasing the quality of life in the Third World is enormous.

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